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TRANSACTIONS

OF THE

AMERICAN ENTOMOLOGICAL SOCIETY

VOLUME LXII

ON NEW OR REDEFINED GENERA OF NEARCTIC MELANOPLI

(ORTHOPTERA: ACRIDIDAE, CYRTACANTHACRINAE)

BY JAMES A. G. REHN AND JOHN W. H. REHN

During the summer of 1935 circumstances made it possible for the authors to carry on intermittent Orthoptera field work in a number of areas scattered over the Appalachian section of Pennsylvania. In the course of this work quite a few species of particular interest were secured and added to the collection of the Academy of Natural Sciences of Philadelphia. In the determination of one of these species a considerable amount of research has been necessary, and as is so often the case the cumulative aspects of what at first seemed a simple problem, have involved an amount of time and labor entirely unanticipated.

While so engaged there was received a recently issued preliminary revision of related Palearctic genera, which necessitated a broader examination of the whole situation, and the present contribution is the result of the work.

Briefly summarized the situation as far as existing literature is concerned is the following. We have in North America two species (i. e. *glacialis*[1] and *polita*[2] Scudder) which by modern authors have been universally referred to the genus *Podisma* Latreille, 1829, an aggregation which in its formerly used broad sense was chiefly Palearctic in distribution.[3] These two species are clearly of boreal origin. We also have an endemic genus *Dendrotettix* Packard, which is austral in distribution, and clearly so in development if not in origin, known to occur disconnectedly in Texas, certain Mississippi Valley States and in New Jersey and New York. In addition the literature gives another species originally described as a *Podisma,* but more recently referred to *Dendrotettix,* which will be discussed in detail on a following page.

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[1] *Pesotettix glacialis* Scudder, Boston Journ. Nat. Hist., VII, p. 630, pl. 14, figs. 9 and 10, (1863), [♂, ♀; Subalpine region of White Mountains, New Hampshire].

[2] *Podisma polita* Scudder, Proc. Davenport Acad. Nat. Sci., VII, p. 158, pl. 7, figs. 1 and 2, (1898), [♂, ♀; Divide (Cottage Grove), Lane Co., Oregon].

The revisionary work mentioned above, which has markedly changed the general conception of generic units of the Palearctic Melanopli,[4] is " Zur Kenntnis der paläarktischen Podismini ", by Dovnar-Zapolskij.[5] In it the author recognizes fifteen genera of Melanopli [6] from the Old World, of which ten are described as new. Of the fifteen genera discussed by Dovnar-Zapolskij the genotypic species of nine are now before us, as well as one of the species included by him in another genus (*Miramella*). Those we have seen material of are: *Eirenephilus, Podisma, Melanoplus, Odontopodisma, Pseudoprumna, Micropodisma, Miramella, Prumna, Zubovskya* and *Cophopodisma.*

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[3] A considerable number of Nearctic species regarded by Scudder in 1897 as members of the genus *Podisma,* have in recent years been removed to *Melanoplus,* very largely through the studies of Mr. Hebard.

[4] As no adopted rule of nomenclature requires group names to be based on that of the first described genus, there is no reason why Scudder's broadly used name Melanopli (Proc. U. S. Nat. Mus., xx, p. 3, (1897)) should not be used for this assemblage. It is, and has been, in universal use in America, where the greater portion of its included species are found.

[5] Travaux Inst. Zool. Acad. Sci. URSS., I, pp. 253–268, 5 text figs., (1933). [In Russian with a German summary.]

[6] As the serial in which Dovnar-Zapolskij's study may not readily be accessible to some interested students, a quoted list of these genera, their genotypes and other included species may be of service.

1. *Eirenephilus* Ikonnikov. (Genotype: *E. debilis* Ikonnikov.)
2. *Podisma* Latreille. (Genotype: *P. pedestris* (Linnaeus).) Also includes *P. satunini* Uvarov, *carpetana* Bolivar, *uvarovi* Ramme and *emiliae* Ramme.
3. *Melanoplus* Stål. Dovnar-Zapolskij does not mention the genotype, which is *femur-rubrum* (DeGeer). He includes the following Palearctic forms: *frigidus* Boheman, *alpinus* Kollar, *alpinus collinus* Brunner, *rufipes* Fischer de Waldheim and a species which he says is the *frigidus* of Puschnik but not of Boheman.
4. *Ognevia* Ikonnikov. (Genotype: *O. sergii* Ikonnikov.)
5. *Anapodisma* Dovnar-Zapolskij. (Genotype: *A. miramae* D.-Z.)
6. *Odontopodisma* Dovnar-Zapolskij. (Genotype: *O. schmidti* (Fieber).) Also includes *O. salamandra* (Fischer) and *fieberi* (Scudder).
7. *Pseudoprumna* Dovnar-Zapolskij. (Genotype: *P. baldensis* (Krauss).)
8. *Micropodisma* Dovnar-Zapolskij. (Genotype: *M. koenigi* (Burr).) Also includes *M. svanetica* Dovnar-Zapolskij.

A reasonably careful analysis of Dovnar-Zapolskij's paper, and an examination of the genera defined by him represented in our series, shows very clearly a lack of proportion in the emphasis given to more than one of the characters used as differential, and also an apparent failure to appreciate what may occur to certain features in species clearly congeneric.

This is glaringly illustrated in the construction of his key to the genera,[7] in which major emphasis is given to two characters either of little or no value as generic criteria in this group. These are, the relative size and degree of development of the tympanum, and the relative length proportions of the prozona and metazona of the pronotum. The first, unaccompanied by any other differential features, is of very uncertain value as a generic index in the Cyrtacanthacrinae, particularly in apterous forms, as in

9. *Miramella* Dovnar-Zapolskij. (Genotype: *M. solitaria* (Ikonnikov).) Also includes *M. dairisama* (Scudder), *mikado* (Bolivar), *formosana* (Shiraki), *kodamae* (Shiraki), ? *aberrans* (Ikonnikov) and ? *sapporensis* [sic *sapporense*] (Shiraki).
10. *Prumna* Motschulsky. (Genotype: *P. primnoa* (Fischer de Waldheim).) Also includes *ussuriensis* Tarbinsky, *primnoides* Ikonnikov and *polaris* Miram.
11. *Zubovskya* Dovnar-Zapolskij. (Genotype: *Z. parvula* (Ikonnikov).) Also includes *Z. koeppeni* (Zubovsky) and *morii* (Bei-Bienko).
12. *Cophoprumna* Dovnar-Zapolskij. (Genotype: *C. surda* D.-Z.)
13. *Pachypodisma* Dovnar-Zapolskij. (Genotype: *P. lezgina* (Uvarov).)
14. *Cophopodisma* Dovnar-Zapolskij. By lapsus calami *Gomphopodisma* in the German key but nowhere else in paper. *Cophopodisma* is used a number of times before the single use of *Gomphopodisma.* (Genotype: *C. pyrenaea* (Fischer).) Also includes *pedemontana* (Brunner), *costae* (Targioni Tozetti), *cobelli* (Krauss) and *parnassica* (Scudder).
15. *Indopodisma* Dovnar-Zapolskij. (Genotype: *I. kingdoni* (Uvarov).)

[7] Certain parts of the generic key also are contradictory. The genus *Cophopodisma* (= *Gomphopodisma*) is placed in the section having the " tympanum klein, rudimentär ", although in the couplet immediately preceeding the generic name it is said to have the " tympanum gross ". In the generic diagnosis, however, the tympanum is said to be " klein ", which is as we find it in material of the genotypic species. Figure 5 is referred to in the key under *Cophoprumna,* but an examination of figure 5 shows it is labelled beneath it and is *Zubovskya parvula,* the genotype of that genus.

certain aggregations there appears to be a correlation of tympanal reduction with other tendencies accompanying apterism. Below we are discussing this as found in the genus *Zubovskya.*

The proportionate length of the prozona and metazona can be used as a generic feature only when the difference is decided and not trivial, and this is particularly true in the Melanopli. Similarly Dovnar-Zapolskij's action in stressing as generic characters minute sculptural features of the male ultimate tergite (supra-anal plate), and at the same time relegating to specific rank fundamental differences in the ovipositor valves of the female, can, and does, led to the formation of artificial groups, which he has clearly done in his genus *Odontopodisma,* a hodge-podge of dissimilar species. Similarly he has given no consideration to certain features of real generic value in this group, such as the inflation or sulcation of the fastigium and of the frontal costa, the complete and deep or dorsally weak impressions of all the transverse sulci of the pronotum, and the general form of the caudal femora. These features are clearly of generic importance and definitely indicate phylogenetic lines, the apparently trivial form of the caudal femora alone being of real significance and value.

It is particularly unfortunate that apparently no careful study seems to have been made by him of the Nearctic genera, or of the work done by Americans on the Nearctic species during the last thirty years. This is even less justified than it would be for a student of the Nearctic forms to disregard work on the Old World members of the group. The far greater development and differentiation, both specific and generic, of the Melanopli in the Neogaeic Realm, embracing as it does some fifty genera and hundreds of species, enables the student of these forms to develop a sense of proportion in values and in inter-specific differentiation of the features found in this Holarctic group, which cannot be gleaned as comprehensively from the limited representation in the Palearctic Region. It is therefore particularly regrettable that the generic foundations used by Dovnar-Zapolskij for a number of his new genera are not sound, and will require radical revision in his promised more elaborate study, or if not then by some other worker giving proper weight and value to a number of the characters utilized in the paper under discussion.

The results of our review of the Palearctic genera demonstrate that the two Nearctic species which have quite generally been considered to belong to *Podisma* (i. e. *glacialis* and *polita*), must be placed in the genus *Zubovskya,* thus bringing that genus into the Nearctic Region; that there is an undescribed Appalachian genus and species standing in reasonable proximity to that genus; and that the genus *Dendrotettix* needs redefinition when considered in relation to the other two genera just mentioned. The following pages present the details and descriptions justifying these conclusions.

Our thanks are due Mr. A. N. Caudell, Custodian of Orthoptera in the United States National Museum, for the privilege of examining certain material there contained essential to the present study, as well as to Mr. Nathan Banks, Curator of Insects in the Museum of Comparative Zoology for the opportunity to study Morse's type of *Podisma scudderi.* Our colleague Mr. Morgan Hebard has greatly assisted by giving unrestricted access to material in his possession, and also the privilege of drawing upon notes made by him from Saussure's type of *Pezotettix zimmermanni* in the Geneva Museum.

Key Characters distinguishing Genera here Discussed

1. Apterous. Cerci of male elongate, surpassing apex of ultimate tergite, tapering, apex somewhat enlarged, subspatulate or obliquely truncate distad and acute-angulate ventro-distad. Ultimate tergite of male with pair of distinct lamellate tubercles placed near distal extremity of carinae bounding median sulcus. Ultimate sternite of male with a distinct subapical tubercle ....*Zubovskya* Dovnar-Zapolskij

Lobi-alate (tegmina only, wings minute hidden rudiments) or fully alate (as phase in *Dendrotettix*). Cerci of male shorter, not surpassing apex of ultimate tergite, either tapering, styliform and distad acute, not subspatulate and acute-angulate, or broad and twisted sublamellate. Ultimate tergite of male lacking paired distinct lamellate tubercles near apex. Ultimate sternite of male variously developed but lacking a subapical tubercle 2

2. Lobi-alate tegmina only. Prosternal spine blunt acute. Ovate tegmina with venation simple, regular, no definite humeral trunk grouping. Cerci of male tapering, styliform. Ultimate sternite of male with apex moderately acute, lateral margins in profile straight. Ovipositor valves of female slender, elongate, dorso-lateral margins of dorsal valves not definitely sigmoid in lateral view. Distal margin of ultimate sternite of female acute-produced meso-distad. *Appalachia* new genus

Both lobi-alate (tegmina) and completely macropterous. Prosternal spine sharply acute, particularly in male. Ovate tegmined phase with venation showing a definite humeral trunk grouping. Cerci of male (not known in one species) short, sublamellate, twisted distad. Ultimate sternite of male with apex not at all acute, lateral margins in profile arcuate. Ovipositor valves of female short, robust, dorsolateral margins of dorsal valves strongly sigmoid in lateral view. Distal margin of ultimate sternite of female obtusely to rectangulate produced meso-distad ....*Dendrotettix* Packard

ZUBOVSKYA Dovnar-Zapolskij

(Pl. I, figs. 4, 5; pl. II, figs. 11, 15, 19.)

(Wholly or in part *Podisma* as understood by Scudder and other American authors, but not of Latrielle, 1829.)

1933. *Zubovskya* Dovnar-Zapolskij, Travaux Inst. Zool. Acad. Sci. URSS., I, pp. 258, 262, 267.

GENOTYPE: *Podisma parvula* Ikonnikov.[8]

The conclusions here drawn as to this genus and its characters have been based on the examination of five specimens of the genotypic species, determined by and received from Dr. Bei-Bienko.[9] In addition to the genotype Dovnar-Zapolskij referred to the genus two Palearctic species, i. e. *koeppeni* (Zubovsky) and *morii* (Bei-Bienko), which we have not seen.

The generic diagnosis comprises eight lines, and the features given include; the general form; the straight or slightly emarginate caudal margin of the pronotal disk; the prozona about three times as long as the metazona; median carina of pronotum distinct; the small tympanum; the roundly triangular male ultimate tergite (supra-anal plate) with two blunt processes on each side of the end of the median sulcation; the male cerci equal in length to ultimate tergite and broadened at the ends; the ultimate sternite (subgenital plate) of male acute conical, the extremity recurved; the ovipositor jaws of female without teeth.

A careful analysis of the features of *parvula*, the genotype, and of the American species *glacialis* and *polita*, shows that the latter two cannot be separated generically from *parvula*, clearly being Nearctic members of the same stock. In this conclusion we have the corroborative support of our colleague Mr. Morgan Hebard, who for over twenty years has been engaged in a revisionary study of the Nearctic members of the Melanopli, and from whose pen many papers of this subject have already appeared.

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[8] Ann. Mus. Zool. Acad. Imp. St. Petersb., XVI, p. 260, pl. 5, fig. 8, (1911), [♂, ♀; Evsejevka, vicinity of Iman, Ussuri, and upper course of Bujan, Siberia].

[9] Vicinity of Kartun, Vladivostok District, Ussuri, Siberia; August, 1927 and August 9, 1927; 3♂, 2♀; [Hebard Cln.].

The inclusion of these American species, however, brings forward discrepancies with Dovnar-Zapolskij's diagnosis of the genus, making necessary a recasting of the generic features. The characters given by the describer of the genus which must be discarded or modified as generic features are, the relative length of the prozona and metazona, the size of the tympanum, the apical development of the ultimate sternite of the male and the character of the margins of the ovipositor of the female.

Generic characters.—Completely apterous. Fastigium non-inflated, shallowly to distinctly excavate. Fastigio-facial angle evident but rounded. Frontal costa subsulcate to sulcate. Pronotum with transverse sulci all continuously evident, strongly impressed on dorsum in males; caudal margin of disk shallowly emarginate mesad; median carina distinct throughout but weaker on prozona than metazona, deeply severed by all transverse sulci in male, in female less distinctly broken up than in male; metazonal length contained one and one-half[10] to two and three-fourth times in length of prozona; metazonal surface closely impressed cribroso-punctulate. Lateral lobes of pronotum slightly longer than deep; ventral margin of lobes evenly obtuse-angulate. Tympanum indicated, of variable size. Prosternal spine acute pyramidical, slightly retrorse. Abdomen on dorsum medio-longitudinally weakly (♂) to rather strongly (♀) carinate. Males with furcula moderately developed; cerci of male slightly surpassing apex of ultimate tergite (supra-anal plate), tapering with distal fourth compressed and widened, in shape subspatulate or obliquely truncate distad with ventro-caudal angle acute; ultimate tergite (supra-anal plate) of male subtrigonal with lateral margins each furnished at proximal third with a distinct dentate production, median ridge and sulcation with lateral margining carinae supplied preapically with a pair of weak to quite distinct fold-like tubercles; ultimate sternite (subgenital plate) of male with a blunt to acute (*parvula*) subapical tubercle, lateral margins arcuate in profile. Female with ultimate tergite (supra-anal plate) trigonal; cerci of female brief, styliform, conical; ovipositor valves slender, compressed, dorsal pair concave on dorsal surface, in lateral view with dorso-lateral margin but weakly sigmoid, ventral valves proximo-ventrad with distinct lateral dentate shoulders, lateral sectorial margins of both dorsal and ventral valves serrato-denticulate; distal margin of ultimate sternite (subgenital plate) of female meso-distad acute-angulate produced. Cephalic and median limbs of male relatively robust, femora appreciably inflated; caudal femora in both sexes relatively slender, tapering in distal two-thirds, in lateral view distal third is very faintly but definitely bent dorsad.[11] Caudal tarsi with metatarsus and third tarsal article subequal in length.

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[10] This latter proportion is seen in females of *Z. polita*. Dovnar-Zapolskij gives the proportions for the genus as three times, but grating measurements give two and three-fourth times in the male of *parvula* as the extreme in that direction.

Distribution of genus in North America.—Discontinuous, with one stock (*polita*) occurring in western Oregon, and the other (*glacialis*) ranging from Minnesota eastward across Michigan, Ontario, Quebec to Prince Edward Island, in portions of New York, Pennsylvania and New England, and southward in the Appalachians to western North Carolina.

Nearctic components.—The Nearctic forms which are referable to the genus *Zubovskya* are: *Z. polita* (Scudder) [*Podisma polita* Scudder] and *Z. glacialis* (Scudder) [*Podisma glacialis* of authors], the latter divisible into three subspecies, 1. *Z. glacialis glacialis* (Scudder) (see plate I, figs. 4 and 5, and pl. II, figs. 11, 15 and 19) 2. *Z. glacialis canadensis* (E. M. Walker), 3. *Z. glacialis variegata* (Scudder).[12]

Remarks.—Material of both sexes of all of these forms has been examined and compared with the genotype (*parvula*). All of the American representatives have relatively large tympana when compared with those of *parvula*. This tympanal size range is not, however, a generic feature, unless we forget that the function of a genus is as much to show natural affinities and trace phylogeny as to express simple differences. In certain tropical genera of Acrididae we find considerable tympanal size variation in apterous or subapterous forms, and within other Nearctic genera we find very appreciable specific variation in tympanal size and shape. The ecological niche occupied by certain species may prove to be an influencing factor in this respect. Certainly the fundamental agreement in virtually all other noteworthy features of *parvula* and the American forms demonstrates their intimate relationship.

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[11] Less evident in material of *Z. glacialis canadensis* than in the other forms of the genus seen by us. This apparently trivial feature is of very real value in tracing the relationship of these genera, when comparison is made with a number of others referred to the group.

[12] For an analysis of the subspecies of *glacialis*, the student is referred to E. M. Walker's classic study of that subject. Canad. Entom., XXXV, pp. 295–302, plate 6, (1902).

APPALACHIA[18] new genus

(Pl. I, figs. 1-3; pl. II, figs. 12, 16, 20.)

1917. *Dendrotettix* Fox, Proc. U. S. Nat. Mus., LII, p. 220. (Not of Packard, 1890.)

1920. *Dendrotettix* Blatchley, Orth. N. E. Amer., p. 339. (In part.)

A genus related on one hand to *Zubovskya* and on the other to *Dendrotettix*, representing a link in the evolution of the phylum to which they belong. The present genus shows in sum total of features its transitional position, but is in itself so clearly cut off from the other two that it could be included in either of them only by doing violence to recognized generic concepts.

The ovipositor structure throws *Appalachia* toward *Zubovskya*, while that of the male ultimate tergite (supra-anal plate) is nearer what is found in *Dendrotettix*. The presence of lobate tegmina is not in agreement with *Zubovskya*, but we do not know whether *Appalachia* ever becomes macropterous and functionally winged, as *Dendrotettix* does in one of its phases. The chief differential features have already been given in the key to genera on a preceding page.

Generic characters.—Tegmina lobate, laterad; wings absent. Body surfaces, and particularly of limbs, with numerous erect short hairs. Fastigium broad, non-inflated, disk shallowly impressed, in profile declivent. Fastigio-facial angle in profile marked, narrowly rounded. Frontal costa shallowly sulcate. Pronotum with transverse sulci continuously indicated, on dorsum decided in male, less strongly in female; caudal margin of disk as a whole arcuate, with shallow median emargination; median carina evident throughout, in part less marked on prozona than on metazona, in female less distinctly severed by first and second transverse sulci than in male; metazonal length contained from one and three-tenth (♀) to one and one-half (♂) times in length of prozona; surface of metazona impressed cribroso-punctulate. Lateral lobes of pronotum with depth one and one-half times in dorsal length of lobes; ventral margin of lobes arcuate emarginate in cephalic half, caudal half straight, ventro-caudal angle rounded obtuse. Tegmina reaching to distal margin of proximal abdominal tergite, ovate, venation simple parallel veins without humeral trunk grouping. Wings represented by brief rudiments. Tympana strongly developed. Prosternal spine erect, blunt acute, pyramidical, sharper in male than in female. Abdomen dorsad medio-longitudinally fine carinate. Male with furcula well developed, moderately divergent; cerci of male not reaching to apex of ultimate tergite (supra-anal plate),

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[18] In allusion to the Appalachian habitat of the genotypic, and sole, species.

simple, styliform, tampering, apex acute; ultimate tergite (supra-anal plate) of male subtrigonal, with a median sulcation and pair of angulate lateral ones, apex acute, lateral margins sinuate, at proximal third each with a pronounced angulate raised point, no paired tubercles near distal extremity; ultimate sternite (subgenital plate) of male with apex subacutely rounded, no preapical tubercle present, lateral margins in lateral view nearly straight. Female with ultimate tergite (supra-anal plate) acute trigonal; cerci of female brief, styliform, conical; ovipositor valves slender, moderately compressed, dorsal pair concave on dorsal surface, in lateral view with dorso-lateral margin but weakly concave before apex, ventral valves proximo-ventrad with weak lateral dentiform shoulders, sectorial margins of both dorsal and ventral valves serrato-denticulate; distal margin of ultimate sternite (subgenital plate) of female mesodistad acute-angulate produced. Cephalic and median limbs of male robust, femora appreciably inflated; caudal femora slender in both sexes, in general tapering in distal two-thirds. Caudal tarsi with metatarsus and third article subequal in length.

GENOTYPE: *Appalachia hebardi* new species.

Distribution.—In various groups of the Appalachian Mountains from west-central Virginia (Bath County) and adjacent West Virginia (Greenbrier County) north to northeastern Pennsylvania (Lackawanna County).

Appalachia hebardi[14] new species (Pl. I, figs. 1–3; pl. II, figs. 12, 16, 20.)

1917. *Dendrotettix australis* Fox (not *Podisma australis* Morse = *Podisma scudderi* Morse), Proc. U. S. Nat. Mus., LII, p. 220. [♀; Monterey (Sounding Knob), Virginia.]

1920. *Dendrotettix scudderi* Blatchley (in part, not *Podisma scudderi* Morse), Orth. N. E. Amer., p. 340. [♂, ♀; Catamount Trail, near White Sulphur Springs, West Virginia; Sounding Knob, near Monterey, Virginia; Bald Knob, Bath County, Virginia.]

Type.—♂; Buffalo Flat, between Buffalo and Branch Mountains, Union County, Pennsylvania. Elevation, 2600 feet. July 31 to August 2, 1935. (Rehn and Rehn). [Academy of Natural Sciences of Philadelphia, Type no. 5546].

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[14] Dedicated to our colleague Mr. Morgan Hebard, in recognition of the fact that the greater part of the modern work on the North American Melanopli is the result of his labors, and also that he was one of the first to collect the present genus and species, i.e. in 1916 at Bald Knob, Virginia.

Size medium;[15] *form moderately robust.*

Head rather broad, greatest width across genae contained one and one-half times in greatest depth of head; fastigium with greatest width equal to one and two-third times length of same cephalad of least interocular space, rectangulate in outline, disk shallowly impressed caudad to point of least interocular width, latter equal to three-fourths width of fastigium, in profile declivent ventro-cephalad at angle of 45 degrees; facial line slightly retreating, fastigio-facial angle definite but well rounded; frontal costa slightly arcuate expanded between antennal bases, narrowing at median ocellus as much as dorsad to fastigio-facial angle, progressively less evident ventrad of median ocellus, distinctly sulcate dorsad of same, more weakly so ventrad of that point;[16] lower face and that portion of frontal costa with surface sparsely impresso-punctate. Eyes prominent, appreciably exserted, subglobose, in profile broad ovate, slightly deeper than length of infra-ocular sulcus. Antennae elongate, when extended caudad reaching to distal margin of second abdominal tergite, filiform, composed of twenty-three articles.

Pronotum subsellate in general form, but not concave dorsad, greatest caudal width of disk equal to five-eighths of greatest pronotal length; cephalic margin of disk bisarcuate with a shallow and weak median emargination; gently arcuate caudal margin of disk with the faintest trace of a broad median emargination; median carina marked on metazona, very definite but less strongly indicated on cephalic section of prozona and little evident between the deep transverse sulci; metazonal length contained one and two-fifth times in that of prozona; lateral lobes distinctly longitudinal; cephalic margin of lobes sinuato-arcuate, ventro-cephalic angle rounded obtuse, cephalic half of ventral margin markedly arcuate-emarginate, caudal half of same straight to the obtuse-angulate ventro-caudal angle, thence passing to the ascending oblique truncate caudal margin; surface of lobes with transverse sulci quite deeply impressed, and metazona entirely cribroso-punctulate like the surface of dorsum of the same area.

Tegmina elongate ovate, greatest length equal to one and four-fifths times the greatest width of same, reaching to caudal margin of proximal abdominal segment; costal margin more strongly arcuate than the sutural, which latter is faintly subsinuate,[17] apex bluntly rounded, slightly nearer sutural margin; dorsal interval between tegmina equal in width to greatest tegminal width; venation made up of approximately nine longitudinal, evenly spaced nervures, some less definite and complete than others, all evenly curving distad, without any definite grouping into a humeral trunk, and with but few rudimentary cross-veinlets. Wings represented by minute rudiments hidden under tegmina.

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[15] The features given in the generic description have been repeated here only when elaboration is necessary.

[16] The strength of this portion of the sulcation is individually variable.

[17] Individually the exact shape of this margin varies from one extreme in which it is definitely, even if very weakly, subsinuate, to an opposite one in which it is definitely and as a whole arcuate, but less so than the costal one.

Abdomen moderately compressed; proximal abdominal segment with large, broad, ovate tympana: furcula distinct but short, acute, subtrigonal, separated by a broad trigonal interspace; ultimate tergite (supra-anal plate) with its median length equal to one and one-fifth times proximal width of same, median sulcation interrupted mesad and shallower than the angulate lateral pair, paired raised points at proximal third of lateral margins due to an angled emargination of the latter, which are straight and even proximad of this point and thence distad sharply cut away juxtacercally; cerci straight, subcompressed, styliform, conical, acute; ultimate sternite (subgenital plate) weakly compressed, in lateral view bluntly conical with its lateral margins nearly straight, seen from dorsum latter are arcuate convergent to the subacutely rounded apex.

Prosternal spine moderately acute, erect. Interspace between mesosternal lobes transverse, distad equal to width of one of the lobes; interspace between metasternal lobes subquadrate.

Cephalic and median limbs quite short, stout. Caudal femora reaching caudad almost to apex of ultimate sternite (subgenital plate), slender, greatest depth contained five times in greatest length, gradually narrowing from point of greatest width, which is at proximal third, to pregenicular constriction, the latter equal to about half of greatest depth of femur; pattern of pagina regular but not deeply impressed; genicular lobes with ventral margin sinuate, distal point rounded acute-angulate: caudal tibiae with ten spines on external margin.

Allotype.—♀; same data as type. [Academy of Natural Sciences of Philadelphia].

Differing from the description of the genus and that of the male sex solely in the following noteworthy features.

Size rather large (for group); form heavier and more robust than in male.

Head with greatest width across genae contained one and two-fifth times in greatest depth of head; fastigium with greatest width equal to one and four-fifth times length of same cephalad of least interocular space, slightly obtuse-angulate in marginal outline; least interocular space equal to two-thirds greatest width of fastigium. Eyes smaller and less prominent than in male, less exserted and not truly subglobose, in profile less ovate and more flattened cephalad than in male, in depth subequal to that of infraocular sulcus. Antennae proportionately shorter than in male, when extended caudad falling slightly short of tegminal apices.

Pronotum less subsellate than in male, more regularly broadening caudad, greatest caudal width of disk equal to seventeen-twentieths of greatest pronotal length; caudal margin of disk slightly more arcuate than in male, laterad more broadly passing into caudal margins of lateral lobes, median emargination of same as in male; median carina more delicate than in male, appreciably stronger on metazona than on prozona, transverse sulci of prozona less sharply severing the carina than in male;[18] metazonal length contained one and three-tenth times in that of prozona: lateral lobes as in male.

Tegmina as in male but length equal to two and seven-tenth times their greatest width; dorsal interspace between tegmina equal to one and one-half times the greatest tegminal width.

Abdomen with ultimate tergite (supra-anal plate) trigonal, subtectate, longer than proximal width, subdeplanate and medio-longitudinally excavato-sulcate, with a low but distinct transverse carinate interruption mesad, apex acute; cerci not longer than one-half length of infra-cercal plates, conical, moderately compressed: ovipositor valves slender, compressed, extending distad of ultimate tergite (supra-anal plate); ventral margins of dorsal valves and dorsal margin of ventral valves quite sharp, apices of dorsal valves in lateral aspect weakly upcurved; ventral valves slighter than dorsal pair, apices moderately decurved; serrato-denticulations of dorsal margins of dorsal valves and ventral margins of ventral valves regular; lateral dentate shoulder of ventral valves low but distinct, with a short tooth at the angle: medio-distal angle of ultimate sternite (subgenital plate) acutely produced between bases of ventral ovipositor valves, lateral margins of production distinctly concave.

Prosternal spine erect, pyramidical, with apex rounded. Interspace between mesosternal lobes strongly transverse, widening caudad, its cephalic width equal to that of one of the lobes on the same transverse line, while caudad it is one and one-half times as broad; interspace between metasternal lobes transverse, width between foramina equal to one and one-half times the least width of the mesosternal interspace.

Cephalic and median limbs relatively short, as in male but more slender and femora by no means as inflated. Caudal femora reaching to base of ovipositor valves (in normal extension of abdomen), proportions as in male: caudal tibiae with nine to ten spines on external margin.[19]

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[18] By variation the more caudal of these two may rather deeply cut the carina, while the cephalic may hardly do so at all. There is definite plasticity in this respect in the female, but basically these sulci cut the carina less sharply and completely than the male.

[19] Material in hand shows the number may range from nine to eleven, the allotype showing nine on one tibia and ten on the other, as given above.

Measurements (in millimeters)

	Length of body	Length of pronotum	Greatest (caudal) width of pronotal disk	Length of tegmen	Greatest width of tegmen	Length of caudal femur
♂						
Moosic Lake, Pa., *paratype*	15	3.44	2.43	2.52	1.34	9.2
Near Poplar Gap, Pa., *paratype*	16	3.36	2.6	2.6	1.34	8.9
Near Poplar Gap, Pa., *paratype*	17	3.86	2.85	2.85	1.26	9.4
E. of Leonardsville, Pa., *paratype*	17.5	3.69	2.91	3.86	1.42	9.6
Buffalo Flat, Pa., *paratype*	18	3.86	2.85	3.02	1.17	10.2
Buffalo Flat, Pa., *type*	20.5	4.28	3.02	2.77	1.42	10.9
Buffalo Flat, Pa., *paratype*	22.1	4.45	3.19	3.19	1.68	11.
Kennedy's Peak, Virginia	19	4.36	2.85	2.91	1.68	11.
Bald Knob, Virginia	20.5	4.2	2.77	3.19	1.51	10.5
♀						
Buffalo Flat, Pa., *paratype*	25.5	4.53	4.03	4.45	1.42	12.
Buffalo Flat, Pa., *allotype*	29.	5.37	4.28	3.78	1.68	13.2
Big Bald Knob, Virginia	31.	4.53	4.28	4.78	2.18	13.7
Camp Todd, Virginia	26.9	4.95	4.03	4.03	2.1	11.9
Monterey, Virginia	29.5[20]	5.71	4.53	4.87	2.1	14.2

The above measurements show a definite amount of geographic size variation, very appreciable individual size variation and the extent to which the proportions of the length and breadth of the tegmina fluctuate. Near the northeastern extreme of its range the species averages smaller than it does at Buffalo Flat, even though the elevation of the latter place is greater. This may be due to the more exposed and lower character of the immediate cover frequented at at least two of the localities represented, i. e. near Poplar Gap and near Leonardsville. Similarly this may be a factor in the size of the Moosic Lake specimen, as that district contains large areas with surface conditions much resembling those found at the two localities mentioned above. The Buffalo Gap series exhibits, in the extremes measured above, a fair index of the amount of purely individual size variation which may be present at a single locality.

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[20] Apex of abdomen moderately upcurved.

While the Virginia males do not exceed in size the larger individuals of the same sex from Buffalo Flat, the Monterey female is somewhat larger than any seen from Pennsylvania. The varying proportions of the tegmina show the marked instability in shape found in these organs, a definite indication that they are on the way toward even greater reduction and eventual obsolescence.

Coloration.—The male sex shows a variational range of coloration far more extensive than in the female. In the former there is a fuscous pattern of quite complicated character and variable extent and density, on a paler base coloration, which is always apparent but sometimes locally relatively dull, and again may run toward cinnamon-rufous or greenish gray. In the male the pale base color ranges from cinnamon, in places as bright as dull zinc orange, to hazel and in the greenish gray phase to ecru-olive, the pale ventral portion of the lateral lobes of the pronotum always paler, brighter and more conspicuous than the other pale areas, being at times as vivid as amber yellow or even wax yellow. The face is of the pale base color, the genae faintly lighter, the entire ventral surface of the general tone.[21] A broad dorsal medio-longitudinal band on the abdomen is always evident, and in a large proportion of the individuals seen is sufficiently pale to be markedly contrasted with the dark pattern, which as broad blackish fuscous bars extends latero-caudad from the postocular region across the dorsal half of the lateral lobes of the pronotum, over the tegmina, the pleura and along each side of the abdomen to the base of the antepenultimate tergite, the pleura being parti-colored ventrad of the position of the lateral bars, the pale ventral section of the lateral lobes of the pronotum marked dorso-ventrad with fuscous along the second transverse sulcus, the disk of the pronotum ranging from unmarked and of the pale base color (unusual), to longitudinally pale along the lateral marginal areas with a subequal medio-longitudinal darker bar, which with varying degrees of emphasis, both of the partial or complete indication of the pale lateral areas and a weaker metazonal indication of the median bar, produces a varied range of discal pattern. Occiput generally obscured with blackish fuscous, but sometimes of the pale base color. Cephalic and median limbs of the pale base color, overlaid to a variable degree with infuscate clouding. Caudal femora of pale base color, with lateral face ranging from heavily and almost solidly infuscate, to a condition which is distinctly transverse trifasciate with fuscous, one band premedian, one postmedian and the third distal, the first two chevron-shaped; rarely the bands are subobsolete or obsolete and the femora quite pale except for the distal third; generally the transverse bands continue over the dorsum and across the internal face; ventro-internal sulcus of caudal femora dull yellowish green, genicular lobes in large part of the base color: caudal tibiae dull wax yellow to dull primuline yellow, slightly infuscate distad, the spines blackish distad. Antennae ranging from tawny, pale olivaceous proximad, to cinnamon-brown. Furcula, raised lateral points of ultimate tergite of male and distal section of male cerci blackish fuscous.

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[21] Very rarely the entire ventral surface of the body is as vivid as wax yellow.

Female much duller in color than male, the general color ranging from dresden brown to argus brown and prout's brown, overlaid and finely mottled and flecked with fuscous, the ventral half of the lateral lobes of the pronotum, sometimes the face and genae, and, when evident, pale transverse bars on the caudal femora clay color to snuff brown, the whole venter dull ochraceous-buff to buckthorn brown, the limbs, antennae and eyes as in male, except that the caudal tibiae are always less vividly colored and washed to a variable degree with brownish. The tegmina in the female have certain of the veins pencilled with fuscous, the others of the general color.

The only speciments of the greenish type seen are the two males from Bald Knob, Virginia, taken by Mr. Hebard. All the other degrees of color range described occur in the extensive Buffalo Flat series, which was taken in an area of little more than twenty-five acres.

Specimens examined.—In addition to the type and allotype we have before us the following series, of which the adults from Pennsylvania are considered paratypic:

Moosic Lake, Moosic Mountains, Lackawanna County, Pennsylvania; August 19; 1 ♂ (*paratype*); [Hebard Collection]. Near Poplar Gap, Pocono Escarpment, Monroe County, Pennsylvania, elevation 1850 feet; August 18, 1935; (Rehn and Rehn); 4 ♂ (*paratypes*); [A.N.S.P.]. East of Leonardsville, Carbon County, Pennsylvania, elevation 1800 feet; July 7, 1935; (Rehn and Rehn); 2 ♂ (*paratypes*), 1 immature ♂, 1 immature ♀; [A.N.S.P.]. Buffalo Flat, between Buffalo and Branch Mountains, Union County, Pennsylvania, elevation 2600 feet; July 31 to August 2, 1935;

(Rehn and Rehn); 26 ♂, 13 ♀ (*type, allotype* and *paratypes*), 2 immature ♂; [A.N.S.P.]. Kennedy's Peak, Massanutten Mountain, Virginia,[22] elevation 2500 feet; July 14, 1934; (H. A. Allard); 1 ♂; [U.S.N.M.]. Spring on Elliott's Knob, Augusta County, Virginia,[23] elevation 4000 feet; June 30, 1933; (H. A. Allard); 1 ♀; [U.S.N.M.]. Big Bald Knob, Augusta County, Virginia;[24] September 1, 1934; (H. A. Allard); 2 ♂, 1 ♀; [U.S. N.M.]. Camp Todd, between Big and Little Bald Knobs, Augusta County, Virginia;[25] September 3, 1933; (H. A. Allard); 1 ♀; [U.S.N.M.]. Monterey, Highland County, Virginia; September 1, 1914; (Henry Fox); 1 ♀; [U.S.N.M.].[26] Bald Knob, Bath County, Virginia, elevation 3900–4000 feet; August 14 and 19, 1916; (Hebard); 2 ♂; [Hebard Collection].[27]

Synonymic history.—This is the species recorded and described by Fox and Blatchley, on the basis of Virginia and West Virginia material, as *Dendrotettix australis* and *scudderi* respectively, confusing it with the more southern species previously described by Morse as *Podisma scudderi* and later renamed by him *Podisma australis.* These latter names are synonymous with *Pezotettix zimmermanni* Saussure, which is discussed at length on a following page under the genus *Dendrotettix,* of which Saussure's species is a member.

Distribution.—This species occurs at a number of localities in the Appalachian ridges and uplifts which flank the Alleghany Plateau on the east. The most northern locality from which it is known is Moosic Lake, Lackawanna County, Pennsylvania, while on the southwest it is known to reach as far as the vicinity of White Sulphur Springs, Greenbrief County, West Virginia, and Bald Knob, Bath County, Virginia.

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[22] Kennedy's Peak is on the line between Shenandoah and Page Counties, at approximately 78° 29′ W., 38° 45′ N.

[23] Elliott's Knob is approximately fourteen miles due west of Staunton, in the ridge charted as "North Mountain" by the U. S. Geological Survey. Its summit is given as 4473 feet.

[24] This peak is situated about twelve miles due north of Elliott's Knob, and its summit reaches 4410 feet.

[25] The specimen is labelled "1000 feet" but this is clearly a transcription error, as topographic maps show there is no point in the valley between the two peaks named which is under 2500 feet elevation.

[26] This is the specimen recorded from Sounding Knob, near Monterey, elevation 4000 feet, by Fox in 1917 and Blatchley in 1920 (vide supra).

[27] This is the material reported by Blatchley in 1920 as *Dendrotettix scudderi* (vide supra), and erroneously as taken by Rehn and Hebard instead of the latter alone, as given on the labels. The former individual has never visited Bath County, Virginia.

It is known from as high as 4000 feet at several stations in Virginia (vide supra) and the lowest at which it has been taken is 1800 feet, near Leonardsville, Pennsylvania, near the western breaking-down of the Pocono Plateau. In Pennsylvania its vertical range goes up to 2600 feet (Buffalo Flat), while in Virginia and West Virginia it is definitely known from no lower than 2500 feet.[28]

Bionomics and season.—Fox encountered this species " on stony ground in the shrubby undergrowth of low open woods " on the side of Sounding Knob at Monterey, Virginia. The Bald Knob males secured by Hebard were taken at the upper edge of oak and chestnut forest in low cover, chiefly of blueberry, hazel and oak sprouts. The present authors' notes show that near Leonardsville, Pennsylvania, it was found in low deciduous coppice growth with ground cover of huckleberries, sweet fern and sheep laurel, the specimens, all seen, being taken from sweet fern; near Poplar Gap, on the southeastern bordering escarpment of the Pocono Plateau, it was encountered in low scrub of stunted but mature oak, low pine,[29] huckleberry, sweet fern and bracken, with occasional ground patches of dry reindeer moss. All the specimens secured at Poplar Gap were from oak, and all seen were captured except one male which escaped. This locality was one of the areas of huckleberry barrens so characteristic of the Pocono region, and which greatly resemble the balds of the more southern Appalachians.

At Buffalo Flat, which is a small, nearly level tract high up at the head of a valley between Buffalo and Branch Mountains, about five miles due northwest of Hartleton, Union County, Pennsylvania, *Appalachia* was found numerous but local, and the series studied (42) was secured by field work extending over three days. The flat bore a culled second growth forest cover composed chiefly of oak, maple and a limited amount of pine, averaging less than twenty-five feet in height, with an undergrowth largely of sweet fern, huckleberry and laurel, with small grassy patches and clumps of alder near the water. The first small colony of the species was found at night, with the aid of a flash-lamp, on alder along a small brook, individuals being both singly and in coitu. The next day it was found more widely in small groups on trunks, branches, twigs and even leaves of black alder, oak, birch and maple, in several cases on laurel beneath trees, on huckleberry bushes, on tree stumps and twice on bare ground. At no time was it noticed more than six feet from the ground and occasionally as many as three were in sight at once. Adult females were much less numerous than adult males, while immature individuals were very sparingly represented. The males were found to be tremendous jumpers, although slow to take alarm. When determined to escape, however, they would launch forth in a leap propelling them as far as a dozen feet. The third day more individuals were seen on bare ground, and it was evident that within the very small area frequented by each limited colony they were distributed over a broad variety of trees and shrubs, occasionally on the ground, and to a degree active at night as well as in the daytime.

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[28] See note on preceding page regarding Camp Todd elevation.

[29] No cones were noticed on the pines, however.

Seasonally in Pennsylvania *Appalachia* occurs adult as early as July 7 (Leonardsville), and immature individuals were encountered as late as August 2 (Buffalo Flat), while the latest date we have for the state is August 19 (Moosic Lake). Adults were few on July 7 and no females were then found. Apparently optimum development so far north is not until late July. Davis took the species near White Sulphur Springs, West Virginia, on July 2, and it is before us from the slopes of Elliott Knob, Virginia secured on June 30. In the last mentioned state it occurs at least as late as September 3 (Camp Todd).

DENDROTETTIX Packard

(Pl. I, figs. 6–10; pl. II, figs. 13, 14, 17, 18, 21, 22.)

1861. *Pezotettix* Saussure, Revue et Magasin de Zoologie, 2e ser., XIII, p. 159. (Not of Burmeister, 1838.)

1890. *Dendrotettix* Packard, Fifth Report U. S. Entom. Comm., p. 214.[80]

1906. *Podisma* Morse, Psyche, XIII, p. 120. (Not of Latreille, 1829.)

GENOTYPE (by monotypy): *Dendrotettix quercus* Packard.

The present genus is definitely related in a number of respects to *Appalachia*, the two clearly being members of the same phylum, while the last mentioned occupies a position intermediate between *Zubovskya* and *Dendrotettix*. The latter genus, although more austral in distribution than the other genera of the phylum, is probably of northern derivation, like the other two, and this is particularly indicated by the characters and regional restriction of *D. zimmermanni*. This species is limited to elevated areas of the Southern Appalachians, while *D. quercus* is more truly a species of lower levels and in general warmer conditions. Structurally *zimmermanni* shows a definite tendency away from *quercus* in the direction of *Appalachia* and *Zubovskya*.

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[80] Caudell (Psyche, XXII, pp. 52-54, (1915)) has very clearly and concisely stated the involved nomenclatoral history of this generic name. We fully agree with his conclusions and therefore give the first quotable use of *Dendrotettix* as Packard, 1890.

Generic Characters.—Form relatively robust. Body surfaces, and particularly those of limbs, usually with numerous scattered erect short hairs. Tegmina lobi-alate or macropterous; depending on tegminal development. Fastigium short, transverse, obtuse-angulate, truncate cephalad at juncture with frontal costa, disk shallowly excavate, in profile fastigial line declivent to the rounded obtuse-angulate fastigio-facial angle. Frontal costa relatively broad, sulcate about and to a variable degree dorsad and ventrad of median ocellus. Pronotum with transverse sulci continuously indicated on dorsum; cephalic margin of disk arcuate, caudal margin arcuate to broadly obtuse-angulate, entire or shallowly emarginate mesad; median carina on prozona as strong as or but slightly less evident than on metazona, severed by all transverse sulci; metazonal length contained from one and one-fourth (♀) to slightly more than one and one-half (♂) times in length of prozona; surface of metazona impressed cribroso-punctate to punctulate (latter in *zimmermanni*). Lateral lobes of pronotum with depth contained one and one-third to one and three-fifth times in dorsal length of lobes; ventral margin of lobes arcuate-emarginate in cephalic half, caudal half straight to shallowly concave, caudo-lateral angle obtuse with immediate angle rounded. Tegmina in macropterous phase (of *quercus*) distinctly surpassing apex of abdomen, in same venation of fundamental type but generalized in the areal arrangement; in lobi-alate phase (of both species) with tegminal apices reaching only to caudal margin of proximal abdominal tergite, very broad ovate to elongate elliptical, venation not concentrically parallel, showing in its arrangement a definite humeral trunk grouping. Wings in macropterous phase reaching to apices of closed tegmina, the secondary venation irregular and unstable; in lobi-alate phase present merely as small, metanotal marginal lobes hidden beneath the tegmina. Tympana well developed in both macropterous and brachypterous phases. Prosternal spine erect, acute, sharply so in male. Abdomen dorsad medio-longitudinally finely carinate. Male with distinct but small and spaced furcula; cerci of male[81] failing to reach apex of ultimate tergite (supra-anal plate), sublamellate, stout, twisted distad, apex blunt; ultimate tergite (supra-anal plate) of male[81] elongate subtrigonal, with median and lateral longitudinal sulcations, latter angulate, lateral margins straight oblique convergent to distal fourth, whence they are sigmoidally sinuate to the rectangulate apex, at middle of their length with a transversely disposed, erect, subdentiform ridge, no paired tubercles near distal extremity; ultimate sternite (subgenital plate) of male [31] broadly scoop-shaped, in profile apex not produced, no preapical tubercle present, in dorsal view margin of plate semi-ovate, in lateral view the proximal portion of the margin arcuato-lobate. Female with ultimate tergite (supra-anal plate) compressed subtectate trigonal with apex narrowly rounded; cerci of female very brief, styliform, conical: ovipositor valves short, stout, their bases heavy and apices much more slender, the latter hardly at all compressed; dorsal pair with dorsal surface not at all concave or only so distad of heavier base, in lateral view with dorso-lateral margin strongly sigmoid; ventral valves proximo-ventrad with marked lateral dentiform shoulders, sectorial margins of both dorsal and ventral valves serrato-denticulate: distal margin of ultimate sternite (subgenital plate) of female obtuse (*quercus*) to rectangulate (*zimmermanni*) produced mesad. Cephalic and median limbs of male moderately robust with femora appreciably inflated, of female more slender; caudal femora moderately slender in female, slightly more robust in male; caudal tarsi with metatarsus and third article subequal in length.

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[81] Male unknown in *D. zimmermanni*.

Distribution of genus.—Discontinuous. From the east-central Texas (Travis and Washington Counties) eastward across southeastern Kansas [32] and Missouri to southern Iowa and Illinois, reaching as far as northern Illinois (Crete); possibly by accidental introduction in southern and south-central New Jersey and central Long Island, New York; [33] and (a second species) also in the higher mountains of South Carolina and northern Alabama.

Species of genus.—As here understood *Dendrotettix* contains two strikingly different species, one, dimorphic, of relatively broad distribution but apparently local and of irregular abundance (*quercus*); the other brachypterous, montane and apparently of very circumscribed distribution (*zimmermanni*). The latter has a very complicated nomenclatoral history, which has involved *Appalachia hebardi* described on a preceding page.

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[32] The genus has been credited to northeastern Nebraska by Bruner in 1893, but Hebard (Proc. Acad. Nat. Sci. Phila., LXXXIII, p. 191, (1931)) questions its occurrence in that state, the Bruner Collection containing no material to substantiate the record.

[33] We are by no means convinced that the general idea the scattered New Jersey and New York colonies of *Dendrotettix quercus* are due to accidental introduction is correct. From many year's acquaintance with the country frequented in New Jersey, we would say it is hardly conceivable that introductions would occur in some of the wildest and least disturbed sections of that state, where this species has been found. It is quite within the range of possibility that it is endemic there, and due to its peculiar habits and erratic appearances has been overlooked in the past. One explanation is as plausible as the other, when the environments and the former inaccessibility of much of the New Jersey Pine Barrens are known.

Key to Species of Dendrotettix (based on the female sex)

1. Tegmina abbreviate only, elongate elliptical, width of same little or not at all exceeding one-half of tegminal length. Head and pronotum less inflated, eyes less prominent; fastigium less blunted and less sellate, not at all concave dorsad; disk of pronotum passing into lateral lobes without marked lateral angles, metazona more finely impressed cribroso-punctulate. Dorsal and ventral valves of ovipositor more slender, subcompressed. Coloration not at all brilliant, without contrasted clear yellow and reddish areas ....*zimmermanni* (Saussure)

Tegmina abbreviate or fully developed, in former phase very broad ovate with width equal to nearly or quite three-fourths of tegminal length. Head and pronotum stouter, robust, more inflated, eyes more prominent; fastigium blunter and more strongly transverse. Pronotum broader, appreciably sellate, distinctly concave at the principal transverse sulcus; disk of metazona subdeplanate and separated from lateral lobes by distinct although rounded lateral angles; surface of metazona coarsely impressed cribroso-punctate. Dorsal and ventral valves of ovipositor heavy, stouter, not at all compressed. Coloration usually relatively brilliant, with areas of contrasted clear yellow and reddish [84] ....*quercus* Packard

Dendrotettix zimmermanni (Saussure)

(Pl. I, figs. 9, 10; pl. II, figs. 13, 17, 21.)

1861. *Pezotettix zimmermanni* Saussure, Revue et Magasin de Zoologie, 2e ser., XIII, p. 159. [♀; "Carolina".]

1906. *Podisma scudderi* Morse, Psyche, XIII, p. 120. (Not *Podisma scudderi* of Walker, 1870, which is a mere combination.) [♀; Cheaha [Che-aw-ha] Mountain, Alabama.]

1907. *Podisma australis* Morse, Psyche, XIV, p. 57. [To replace *Podisma scudderi* Morse, 1906, not the combination *Podisma scudderi* of Walker, 1870.]

1907. *Podisma australis* Morse, Publ. no. 68, Carneg. Inst. Wash., p. 45. (Quotes original description of *Podisma scudderi*, 1906.)

1920. *Dendrotettix scudderi* Blatchley, Orth. N. E. Amer., p. 339. (In part; only in reference to type of *Podisma scudderi* Morse.)

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[84] This is the usual condition, but there is in this species a grayish color phase which has the whole tone gray to gray brown, with the red ventro-internal sulcus of the caudal femora and the dull purplish of part of the caudal tibiae the only patches of any brilliancy.

Types. The unique female type of *Pezotettix zimmermanni* has been dried from alcohol. It is contained in the collection of the Geneva Museum of Natural History, which received it as part of the Saussure Collection. The locality label it bears reads "S[outh] Carol [ina]." The unique female type of *Podisma scudderi* is in the collection of the Museum of Comparative Zoology. Notes on both of these types are given on a following page.

Nomenclatoral history.—To clearly understand the confusing history of this species a chronological discussion of the literature is necessary. Saussure described *Pezotettix zimmermanni* from "Carolina", and gave no information as to who collected the unique type, but from its name one may justly conclude it was taken by and reached Saussure, directly or indirectly, from Dr. Christian Zimmermann, who spent a large part of his life in the two Carolinas. An examination of Hagen's summary of Zimmermann's travels,[85] as well as the latter's journal, the mutilated remainder of which, along with much of his collection, is in the possession of the American Entomological Society,[86] shows but four "Carolina" localities at which Zimmermann resided during his thirty-five years in the United States. These are: Georgetown, South Carolina, Barhamville, South Carolina (apparently now a part of the city of Columbia),[87] Columbia, South Carolina, and Rockingham, North Carolina. From what we know of the distribution of *zimmermanni,* as presented on a subsequent page, it would seem that the original specimen of the species was taken at none of these localities, but was secured by Zimmermann on one of his numerous journeys or sent to him by some other interested person. As here shown the type specimen is definitely labelled "South Carolina". In consequence we can properly consider the original locality of *zimmermanni* to have been the more elevated portion of that state.

Saussure's description of *zimmermanni* is relatively brief and stresses but few diagnostic features of value. In his classic "Revision of the Melanopli" Scudder was unable to place *zimmer-*

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[85] Canad. Entom., XXI, p. 53 et seq., (1889).

[86] This diary, bequeathed to the Society by Dr. George H. Horn, is the one from which Hagen drew the information presented in his article, as stated by him. A dedicated copy of Hagen's sketch of Zimmermann's life was pasted in the journal by Dr. Horn.

[87] Said in the journal to be two miles distant from Columbia.

manni with certainty,[38] but felt it probably was the same as his *Caloptenus nigrescens*, described in 1877. He did not, however, establish this synonymy, and the literature supplies no further critical attempt to place *zimmermanni* either generically or specifically.

Our colleague Mr. Morgan Hebard, while at the Geneva Museum in 1927, located and examined the unique female type of Saussure's *Pezotettix zimmermanni*, and, with his permission, the following comments have been taken from notes made by him at that time. "1 ♀. Dried alcoholic, wholly discolored. Pronotum, shoulders and inflated head show it is a *Dendrotettix*. Tegmina lateral pads slightly longer than wide, in specimen curled to a point dorso-distad, Labelled 'S. Carol.'"

Dr. A. P. Morse, in the course of his investigations on the Acrididae of the southeastern United States, made some twenty years ago, secured at Cheaha Mountain, Alabama, a single female individual of a melanoploid which he described as *Podisma scudderi*,[39] later changing the name to *Podisma australis*,[40] on account of the earlier use by Walker[41] of the combination *Podisma scudderi* for the species which is now known as *Melanoplus scudderi*. In 1920 Blatchley[42] called attention to the fact that Morse's species was a member of the genus *Dendrotettix*, and described as the male sex of it one taken near White Sulphur Springs, West Virginia, also recording as the same a female from Sounding Knob, near Monterey, Virginia, and two males secured on Bald Knob, Bath County, Virginia by Hebard (not Rehn and Hebard as stated). All of the specimens examined and discussed by Blatchley except Morse's type of *Podisma scudderi*, represent *Appalachia hebardi* described on a preceding page of this paper. A visit to the Museum of Comparative Zoology in the past September permitted us to compare our own quite full series of *Appalachia* with the type of Morse's *scudderi* (= *australis*), and through the courtesy of Mr. A. N. Caudell, Custodian of Orthoptera at the United States National Museum, the representation of the Appalachian species of both genera there contained was placed in our hands for study. With the exception of the single male taken by Davis near White Sulphur Springs, West Virginia, we have examined or now have before us all the material referred by Blatchley in 1920 to "*Dendrotettix scudderi*".

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[38] Proc. U. S. Nat. Mus., xx, pp. 225, 226, 406, (1897).

[39] Psyche, XIII, p. 120, (1906).

[40] Psyche, XIV, p. 57, (1907).

[41] Catal. Derm. Salt. Brit. Mus., IV, p. 718, (1870).

[42] Orth. N. E. Amer., pp. 339–340, (1920).

Remarks.—While the present species and *Appalachia hebardi* have a general similarity, they can readily be distinguished by the features given in the preceding key to genera, and in the female sex one glance at the form of the ovipositor jaws is all that is needed to show the proper generic position. The pronotal form, tegminal venation and additional genitalic features of both sexes fully support our conclusions as to the fundamental affinity of this species with *D. quercus*, and the much less intimate relationship to *Appalachia.*

While unfortunately the male sex of *zimmermanni* remains unknown to us, as to previous workers, when discovered it doubtless will show excellent structural differences supporting the diagnostic characters given from the female sex.

The following features, drawn from the single female individual now in hand, are supplementary to those already given in the generic and specific keys.

Female: Pinnacle Mountain, Pickens County, South Carolina. August 3, 1926. (F[ranklin] Sherman). [United States National Museum].

Head with width across genae very slightly greater than that across eyes; fastigium with greatest width equal to twice length cephalad of least interocular space, lateral margins rectangulate, cephalad converging, lateral foveolar areas appreciably impressed, disk shallowly but entirely concave, juncture with frontal costa transversely truncate; interocular width equal to two-thirds of greatest width of fastigium; frontal costa slightly expanded between antennal bases, its margins converging both dorsad and ventrad of same and subparallel ventrad of median ocellus, surface of costa moderately sulcate about and less strongly so dorsad and ventrad of median ocellus. Eyes moderately prominent, in outline broad ovate, flattened cephalad, in depth subequal to that of infra-ocular sulcus. Antennae when extended caudad surpassing the tegminal apices by approximately one-half of tegminal length, composed of twenty-three articles.

Pronotum not at all concave dorsad, in profile dorsal line is nearly straight, dorsum rounding laterad with little break into the vertical lateral lobes, no lateral shoulders present even on metazona, in cross-section the whole pronotum is weakly tectate; cephalic margin of disk weakly and broadly arcuate, caudal margin of disk broad arcuate with faintest possible trace of a shallow and broad median emargination; median carina as distinct and uniform, but less sharply sculptured, on prozona as on metazona; metazonal length contained one and three-fifth times in prozonal length; transverse sulci crossing prozona as entire, distinct and as deep as the principal one but narrower. Lateral lobes of pronotum with greatest depth contained one and one-half times in dorsal length of same; cephalic margin weakly sinuate, ventro-cephalic angle obtuse; ventral margin with cephalic emargination deeply concave, median emargination rounded obtuse, caudal portion of ventral margin sinuate; caudal margin straight oblique ascendant, passing evenly into caudal margin of disk.

Tegmina elongate-ovate, not surpassing distal margin of proximal abdominal tergite, principal longitudinal venation marked, humeral and discoidal veins closely placed, virtually fusing near base and forming a definite humeral trunk, cross-veins numerous, short, irregular in prehumeral and postulnar sections. Wings mere lobate rudiments laterad on metanotum.

Tympana broad, in outline much the same as that of the eyes. Cerci very short, stout, conical, apices blunt. Ovipositor valves moderately robust, subcompressed in proximal half; dorsal pair with dorsal surface of narrowing distal two-fifths evenly concave, not abruptly cut off from the subdeplanate surface of the proximal half, the narrowed apices of the dorsal valves somewhat incurved as seen from dorsum, in lateral view dorso-lateral margins of dorsal valves strongly sigmoid and crenulato-denticulate; ventral valves in lateral as well as ventral view less robust than in *D. quercus*. Distal margin of ultimate sternite (subgenital plate) rectangulate.

Cephalic and median limbs slightly more slender than in female of *D. quercus* Caudal femora with carinae and paginal pattern less sharply marked than in *quercus*: caudal tibiae with nine external, ten to eleven internal spines.

Measurements (in millimeters)

	Length of body	Length of pronotum	Greatest (caudal) width of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur
♀, "Carolina" *type*, ex Saussure	25.	—	—	—	—	—
♀, Pinnacle Mtn., South Carolina ...	28.5	5.7	4.6	4.87	2.43	12.9
♀, Cheaha Mtn., Alabama, *type* of *P. scudderi*, ex Morse	25.	5.	—	4.	2.5	12.

Coloration (from female described above).—Pale base color ochraceous-buff to pale dull orange-ochraceous, overlaid with a pattern and cloudings of dresden brown to mummy brown. Head with face, mouth-parts and genae very decidedly but finely mottled, the postocular bars solidly dresden brown, the occiput almost solidly prout's brown, the fastigium heavily washed with mummy brown; eyes cinnamon-rufous clouded with mummy brown; antennae cinnamon-rufous proximad, passing through clay color to prout's brown distad. Pronotum with ventral half of lateral lobes of pale base color, dorsal border of latter angularly broken, this area narrower on metazona; continuation of postocular bars solidly prout's brown, extending across prozona; dorsum of pronotum and all of darker areas of metazonal lobes buckthorn brown, on dorsum paling faintly on each side of median carina to tawny-olive. Tegmina cinnamon-brown, at sutural side of base in a small area paling to buffy. Abdomen solidly mummy brown on each side, dorsum finely vermiculate with same on dull orange-ochraceous base color, venter of abdomen as well as of thorax of base color. Caudal femora with pale base ochraceous-buff, crossed by four transverse bars of prout's brown to mummy brown, one proximad, one premedian, one postmedian and one distal, the latter involving the whole extremity including the genicular lobes, these bars crossing the internal face but not the ventral sulcus, which is entirely of the pale base color. Caudal tibiae pale glaucous, over-washed very largely with cinnamon-brown, the spines clear glaucous but black tipped.

Distribution.—Known definitely only from Cheaha[43] Mountain, on the boundary between Clay and Talladega Counties, Alabama, and Pinnacle Mountain, Pickens County, South Carolina.[44] At the first mentioned locality it was taken at 2400 feet, and at the second at about 2000 feet elevation.[45] Morse states it was taken on Cheaha Mountain " in the vicinity of Pulpit Rock, near the summit of the mountain ".

Bionomics and season.—The sole datum we have on the habitat frequented by this species is that Morse took it while " sweeping grass and shrubbery ". The known dates of its occurrence are July 13 (Cheaha Mountain) and August 3 (Pinnacle Peak).

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[43] This locality was originally given as above, but the printed label on the type is " Chehawhaw Mtn." The name is given as " Che-aw-ha " on the Ashland topographic sheet of the U. S. Geological Survey, and also in the Century Atlas. The summit elevation is given on the Survey sheet at 2407 feet.

[44] Dr. Sherman informs me that Pinnacle Peak is in Pickens County very near the North Carolina line. This is probably the " Little Pinnacle Mountain " of U. S. Geological Survey charts. It should not be confused with Pinnacle Peak in Henderson County, North Carolina, about twenty-five miles northeast of the South Carolina one.

[45] According to Dr. Sherman in litt.

Dendrotettix quercus Packard (Pl. I, figs. 6–8; pl. II, figs. 14, 18, 22.)

1890. *Dendrotettix quercus* Packard, Fifth Rep. U. S. Entom. Comm., p. 214. [Juvs.; Between Washington and Brenham, Washington County, Texas.]

1891. *Dendrotettix longipennis* Riley, Insect Life, v, p. 255. [♂, ♀; Manor, Travis County, Texas.]

Synonymy.—We fully concur with Caudell's deductions,[46] made after a careful examination of the tangled literature bearing on the question of the first valid publication of and authority for this genus and species, as well as of the synonymous *longipennis.* The literature involved has been examined anew and his conclusions have our full support.

Types.—As Caudell has shown part of the original immature material taken by Bruner, on whose published but unnamed observations Packard based the genus and the species *quercus,* is in the United States National Museum, one of which, a female, has been indicated by him as the single type of *quercus.* The same author has shown that *longipennis* is synonymous with *quercus,* and that both of the names are based on the same (macropterous) phase of the species, the original specimens of *quercus* showing by the wing pads that they represent the fully alate type.

Distribution.—From east-central Texas (Travis and Washington Counties) eastward across southeastern Kansas, Missouri, southern Iowa to as far as northeastern Illinois (Crete). Also occurring, possibly as an accidental introduction (but see page 21, footnote 33), in southern and south-central New Jersey and central Long Island, New York.

Remarks.—Scudder[47] and Blatchley[48] have given detailed structural and color descriptions and measurements of this species, and to these the student is referred. The species is discussed here solely to indicate its position in relation to *D. zimmermanni.* It is to be hoped that more information may soon become available on the extent to which dimorphism is regularly present in the species, and on the factors responsible for these markedly different types. Similarly much data are needed on the periodic abundance and scarcity of *quercus,* which in more than one respect is a particularly interesting species.

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[46] Psyche, XXII, pp. 52–54, (1915).

[47] Proc. U. S. Nat. Mus., XX, pp. 92–93, (1897).

[48] Orth. N. E. Amer., pp. 337–339, (1920).

EXPLANATION OF FIGURES

PLATE I

Fig. 1.—*Appalachia hebardi* new genus and species. Male (*type*). Buffalo Flat, Union County, Pennsylvania. Lateral view. (× 3.)

Fig. 2.—*Appalachia hebardi* new genus and species. Male (*type*). Buffalo Flat, Union County, Pennsylvania. Tegmen. (Greatly enlarged.)

Fig. 3.—*Appalachia hebardi* new genus and species. Male (*type*). Buffalo Flat, Union County, Pennsylvania. Dorsal view of apex of abdomen. (Greatly enlarged.)

Fig. 4.—*Zubovskya glacialis glacialis* (Scudder). Male. Mt. Equinox, Vermont. Dorsal view of ultimate tergite (supra-anal plate). (Greatly enlarged.)

Fig. 5.—*Zubovskya glacialis glacialis* (Scudder). Male. Mt. Equinox, Vermont. Lateral view of ultimate sternite (subgenital plate). (Greatly enlarged.)

Fig. 6.—*Dendrotettix quercus* Packard. Male. Chautauqua County, Kansas. Dorsal view of apex of abdomen. (Greatly enlarged.)

Fig. 7.—*Dendrotettix quercus* Packard. Male. Chautauqua County, Kansas. Lateral view of ultimate sternite (subgenital plate). (Greatly enlarged.)

Fig. 8.—*Dendrotettix quercus* Packard. Male. Chautauqua County, Kansas. Tegmen. (Greatly enlarged.)

Fig. 9.—*Dendrotettix zimmermanni* (Saussure). Female. Pinnacle Mountain, South Carolina. Dorsal view of head and pronotum. (× 3.)

Fig. 10.—*Dendrotettix zimmermanni* (Saussure). Female. Pinnacle Mountain, South Carolina. Tegmen. (Greatly enlarged.)

PLATE II

Fig. 11.—*Zubovskya glacialis glacialis* (Scudder). Female. Speckled Mountain, Maine. Dorsal view of ovipositor valves. (Greatly enlarged.)

Fig. 12.—*Appalachia hebardi* new genus and species. Female (*allotype*). Buffalo Flat, Union County, Pennsylvania. Dorsal view of ovipositor valves. (Greatly enlarged.)

Fig. 13.—*Dendrotettix zimmermanni* (Saussure). Female. Pinnacle Mountain, South Carolina. Dorsal view of ovipositor valves. (Greatly enlarged.)

Fig. 14.—*Dendrotettix quercus* Packard. Female. Chautauqua County, Kansas. Dorsal view of ovipositor valves. (Greatly enlarged.)

Fig. 15.—*Zubovskya glacialis glacialis* (Scudder). Female. Speckled Mountain, Maine. Lateral view of ovipositor valves. (Greatly enlarged.)

Fig. 16.—*Appalachia hebardi* new genus and species. Female (*allotype*). Buffalo Flat, Union County, Pennsylvania. Lateral view of ovipositor valves. (Greatly enlarged.)

Fig. 17.—*Dendrotettix zimmermanni* (Saussure). Female. Pinnacle Mountain, South Carolina. Lateral view of ovipositor valves. (Greatly enlarged.)

Fig. 18.—*Dendrotettix quercus* Packard. Female. Chautauqua County, Kansas. Lateral view of ovipositor valves. (Greatly enlarged.)

Fig. 19.—*Zubovskya glacialis glacialis* (Scudder). Female. Speckled Mountain, Maine. Distal margin of ultimate sternite (subgenital plate) and bases of ventral ovipositor valves. (Greatly enlarged.)

Fig. 20.—*Appalachia hebardi* new genus and species. Female (*allotype*). Buffalo Flat, Union County, Pennsylvania. Distal margin of ultimate sternite (subgenital plate) and bases of ventral ovipositor valves. (Greatly enlarged.)

Fig. 21.—*Dendrotettix zimmermanni* (Saussure). Female. Pinnacle Mountain, South Carolina. Distal margin of ultimate sternite (subgenital plate) and bases of ventral ovipositor valves. (Greatly enlarged.)

Fig. 22.—*Dendrotettix quercus* Packard. Female. Chautauqua County, Kansas. Distal margin of ultimate sternite (subgenital plate) and bases of ventral ovipositor valves. (Greatly enlarged.)

A PROPOSED CLASSIFICATION OF THE NEARCTIC STRATIOMYINAE

(DIPTERA: STRATIOMYIDAE)

BY MAURICE T. JAMES
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(Text figure)

The sub-family Stratiomyinae, as usually limited, is represented in the United States and Canada by three distinct and easily recognizable elements: (1) a group of genera with a primitive, ten-segmented antenna; (2) *Myxosargus;* and (3), the troublesome *Stratiomys-Odontomyia* complex. The first two are not, in the strictest sense, nearctic, our few representatives being tropical insects that have succeeded in coming into our range. The *Stratiomys-Odontomyia* complex includes the most characteristic as well as the most abundant Nearctic Stratiomyidae.

Geoffroy proposed the name *Stratiomys*[1] in 1764; in 1804, Meigen gave us the name *Odontomyia,* and subsequent writers have used this name for species in which the first antennal segment is no longer or but slightly longer than the second. Subsequent European and American authors have alike accepted this disposition of the species up to the present time, with the result that considerable confusion has arisen in regard to the generic status of certain American species. A few rather unsuccessful attempts have been made to divide the American genera; but none of these have touched the problem of drawing a dividing line between the two classical groups.

The confusion has arisen from the fact that the generic concepts, made in Europe, have failed to fit the American species. European *Stratiomys* have the first antennal segment at least four times the length of the second; in European *Odontomyia* the ratio

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[1] This is the original form. *Stratiomyia* is Macquart's emendation. Dipt. Exot. I, 1, p. 179, (1838).

is never more than two to one. If we use this criterion for American species, however, we soon get into difficulties. *Odontomyia occipitalis* Johnson, for instance, has the first segment longer in proportion to the second than do such species as *Stratiomys laticeps* Loew. We should, therefore, consider *O. occipitalis* a *Stratiomys;* and, on the basis of the remainder of the antennal structure, such a procedure would be justified, if only the two genera are to be recognized. However, *O. occipitalis* possesses many characters which are never found in *Stratiomys,* whereas it does possess many of these characters in common with such species as *O. texana* Johnson, in which the antennal ratio is approximately one to one. Moreover, all intergradations between the long first antennal segment of *O. occipitalis* and the short one of *O. texana* are to be found. There are, then, but two courses open: one is to draw an arbitrary line of demarkation between the genera; the other is to seek a new basis of classification.

The second solution is the one adopted here. The keynote to this classification is merely an application of the principle that should govern the work of the systematist, namely, that phylogenetic lines of cleavage should be sought through a study of the totality of characters rather than through certain characters which are believed on prima facie evidence to be of first-rate importance. An analysis of the characters found in various members of the *Stratiomys-Odontomyia* complex shows the need of a third genus, in addition to the two classical ones, to receive that group of species beginning with *O. occipitalis* and ending with such as *O. texana,* in which the ratio of the first to the second antennal segment varies from 3: 1 to 1: 1, but which have many characters in common. Though my concept of this group is quite different from that of Enderlein when he proposed the genus *Labostigmina* (type, *O. occipitalis* Johns.), based on venational characters, his name should be applied to this genus. The acceptance of this genus, thus defined, is the point which saves my classification from the difficulties of the old one; my two genera (*Hoplitimia* and *Anoplodonta*) are introduced for groups that are quite distinct and, apparently, phylogentically old.

Perhaps, in the light of the refinements that are taking place in generic concepts, the two classical genera may be further subdivided; but at present I feel that such a step is premature.

Stratiomys and *Odontomyia* do, it is true, have within themselves several divergent elements. Certain of Pleske's proposed subgenera would include American species; but we have others that are totally unlike the Old World species. Aside from Pleske's subgenera, generic names based on Old World species can not be used. *Psellidotus* Rondani, proposed for *Odontomyia* with hairy eyes, is wholly untenable, since closely related species may differ from each other in this respect; *Hirtea* Scopoli, which is not American, must be redefined on a basis other than that of eye-pilosity, for the same reason. At present, I can not see fit to accept Enderlein's *Odontomyina.*

The main line of cleavage here is based on the structure of the flagellum of the antenna rather than on the comparative lengths of the first and second segments, a purely relative thing. The antenna, in the *Stratiomys-Odontomyia* complex, is seven- or eight-segmented, the segments beyond the second being more or less closely united to form the flagellum. In the *Odontomyia-Anoplodonta* division, the flagellum is six-segmented; the first four of these are moderately long and distinct, the fourth being somewhat tapering; the fifth is short and ring-like; the sixth somewhat longer, sometimes pointed and sometimes blunt, and, in its normal condition, set at an angle with the remainder of the flagellum (Fig. 2). In the *Stratiomys-Hoplitimyia-Labostigmina* division the flagellum is apparently five-segmented, or, if six-segmented, the division between the terminal two segments is very indistinct; there is, moreover, no such differentiation of the terminal segments as in the other division, the flagellum running gradually to a somewhat acute apex (Fig. 1). There is a very strong correlation between length in the first segment and the second type of flagellar structure, but the correlation is not complete.

Within these two major divisions, further tendencies toward differentiation may be seen. Certain of these tendencies deal with characters which are more or less absolute, such as the shape of the scutellum and the position of the scutellar spines; other tendencies are relative, as, for example, the weakening of the scutellar spines in *Labostigmina* and of the wing venation in *Labostigmina* and *Odontomyia.* It is hoped that the following key (which follows what seems to be phylogenetic lines, but which is not as utilitarian as it might be) will indicate these tendencies, as well as to characterize the genera of the *Stratiomys-Odontomyia* complex.

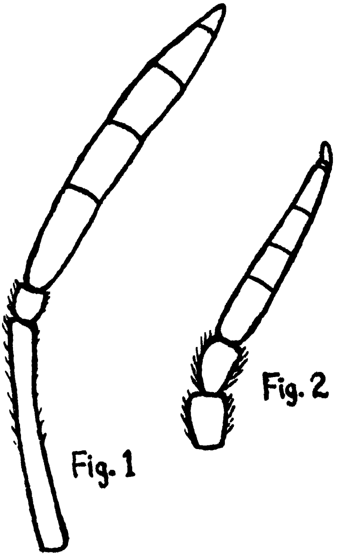

Fig. 1. *Stratiomys unilimbata* Loew. Antenna.
Fig. 2. *Odontomyia cincta* Olivier. Antenna.

Key to Genera

1. Abdomen five to six segmented; antenna without an artista, sometimes with a poorly-defined style; medio-cubital cross-vein present (larvae aquatic) (Stratiomyinae) 2
Without this combination of characters ....other Subfamilies

2. Antennae ten-segmented, those beyond the second more or less fused into a flagellum ....*Cyphomyia* Wiedemann, etc.
Antennae seven- or eight-segmented, those beyond the second more or less fused into a flagellum 3

3. Face produced conically downward; abdomen slender, usually unicolorous, at most without tegumentary markings ......*Myxosargus* Brauer
Face sometimes protuberant, but not conically produced below the oral margin; abdomen usually with pale tegumentary markings; nearctic species, never metallic (*Stratiomys-Odontomyia* Complex) 4

4. Flagellum of antenna five-segmented, the apical segments never forming a style; ratio of first to second segment usually 2:1 or greater; media with three well-developed branches which are, however, sometimes weak 5

Flagellum six-segmented, the fifth segment short and ring-like, the sixth set at an angle to the rest of the flagellum; segments 5 and 6 forming a definite style; ratio of first to second segment less than 2:1, usually about 1:1; either crossvein r-m missing, or one of the branches of the media missing, stump-like, or weakly developed (exc. in *Anoplodonta*) 7

5. Face produced; proboscis elongate, the labellae also elongate, rigid, and slender; scutellum semi-elliptical, the spines located at the apex on the median third 6

Face receding; proboscis short, usually withdrawn, the labellae fleshy; scutellum trapezoidal, the spines located on the outer corners, and outside the median third; vein r-m present; branches of media comparatively strong; wings hyaline, or uniformly and lightly clouded. *Stratiomys* Geoffroy

6. Flagellum flattened; head wider than the thorax; eyes angular in profile; first antennal segment always long; spines of scutellum strong; vein r-m present; branches of media comparatively strong; wings infumated in the region of the strong veins ......*Hoplitimyia* James

Flagellum terrete; head no wider than the thorax; eyes rounded in profile; first antennal segment sometimes short; spines of scutellum weak or evanescent; vein r-m sometimes punctiform or wanting; branches of media long, but weak; wings hyaline or uniformly infuscated ....*Labostigmina* Enderlein

7. Spines of scutellum present, strong, and located within the median third, close together; vein r-m missing, or, if present, at least one of the branches of the media is strongly abbreviated or absent. *Odontomyia* Meigen

Spines of scutellum absent; branches of media well-developed; vein r-m present ....*Anoplodonta* James

ANOPLODONTA new genus

Related to *Odontomyia*, from which it may be distinguished by its unspined scutellum.[2]

Face prominent; antennae eight-segmented, the first segment but slightly longer than the second, the third to eighth fused to form the flagellum; sixth segment tapering; the seventh very short, ring-like; the eighth but slightly longer than the seventh, bluntly rounded. Labellae slender, five times as long as wide, rigid. Scutellum rounded, bulging, with no trace of spines. Abdomen flattened. Wings hyaline; R_4 present; r-m distinctly

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[2] *Camptopelta* Williston has been omitted from this discussion, as I have not seen this genus (described from a single female, and not subsequently recorded in literature); from its description, it would appear to belong close to *Odontomyia*, and it also has an unspined scutellum. Its small size, lack of vein R_4, antennal structure, etc. will distinguish this genus.

present; M_1, M_2, and M_3 present, strong; M_1 and M_2 reaching almost to the posterior margin, and strongly bent anterior to the margin; M_3 somewhat shorter, reaching about halfway to the wing margin, and straight.

GENOTYPE: *Anoplodonta nigirostris* (*Odontomyia nigrirostris* Loew, 1865).

Aside from the genotype, the only living species known to me is *O. nuda* James (Colo., Utah), which might perhaps more properly be considered a subspecies of the above. *Exochostoma* Macquart (1842), is not a synonym.

The spineless condition of the scutellum is apparently quite different from the almost-spineless condition found in certain species of *Labostigmina.* The latter genus is apparently in the process of losing its spines, which, though rudimentary at times, are always present. If I am right in referring the Oligocene *Stratiomys brodei* Cockerell to *Anoplodonta* (where it seems to belong), this genus is an ancient one, and the unspined condition of the scutellum may be a primitive, rather than a derived, one.

According to this classification, the species referred to *Stratiomys* by Johnson in his monograph would fall in *Stratiomys*, with the exception of those which I have transferred to *Hoplitimyia;*[3] all those subsequently described from the United States and Canada (exc. *S. vespoides* James) would also go there. *Labostigmina* would take from *Odontomyia,* as Johnson understood it: *occipitalis* Johnson, *flavicornis* Loew, *obscura* Olivier, *similis* Johnson, *hieroglyphica* Olivier, *texana* Johnson, *viridis* Bellardi and *fallax* Johnson; in addition I would place here, *O. johnsoni* Curran, *O. megantica* Curran, *O. fulvicornis* Curran, *O. annamariae* Brimley, and several undescribed species. With the exception of the two species referred to *Anoplodonta,* the other species which Johnson considered as *Odontomyia,* together with the others which have been described as *Odontomyia* from the nearctic region since the appearance of Johnson's monograph, would remain there.

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[3] **James, Ann. Ent. Soc. Amer., xxvii, p. 443.**

NOTES ON PONTIA PROTODICE BOISDUVAL & LECONTE[1]

(LEPIDOPTERA: PIERIDAE)

BY ORAZIO QUERCI

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This paper is a record of observations made by Mr. Querci while in Philadelphia, Pennsylvania, during 1930, 1931 and 1932.[2] The material upon which these observations is based was collected by him and his wife in the meadows along the Parkway in front of the Art Museum; and rearings were made in cages at their rooms near by. A set of 280 specimens (143 ♂, 137 ♀) showing the full variation of the species throughout the seasons, is deposited in the collection of the Academy of Natural Sciences of Philadelphia; each specimen bearing a numbered pin-label, which numbers cited in this paper refer to these specimens. [E. T. Cresson, Jr.]

ON THE OCCURRENCE OF PONTIA PROTODICE.

Although our observations on this species began in late 1930, we did not study it seriously until 1932. In early October, 1930, we found the species plentiful on the wing, but on the 17th, the temperature having dropped, they ceased to fly. During the winter of early 1931 the temperature sometimes fell to 18° to 20° Fahrenheit (January 16, 16 and 22; February 3 and 11), and the weather continued unpleasant until middle of April. On the 18 to 21 of this month the weather became delightful, and although we visited both the Parkway, where we had seen many on the wing in the fall, and other localities in Fairmont Park, we failed to see a single specimen of this species. In May, other butterflies were on the wing around the Art Museum, but no *protodice,* and it was only by the end of August did we find a few specimens. In September and early October the species again became abundant.

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[1] Lep. Amer. Sept., p. 45, pl. 17, figs. 1.2.3, (1833).

[2] Similar observations by Mr. Querci made on *Pieris rapae* will be found in Ent. Record, XLIV, pp. 168–176, (1932) and Ent. Mo. Mag., LXX, pp. 166–175, 213–224, (1934). The author's present address is: 3 Lysimaxoy, Salonika, Greece.

In 1932 the climate was fine in January; colder in February, and very cold in March (17° to 19° from March 8 to 10, 19° to 21° on the 15th and 16th) turning pleasant and warm on May 15, and was generally hot during the late spring and summer. From May 15 to October 25 of that year we visited the Parkway every day, captured and brought home alive more than 500 specimens of this species. As in the spring and early summer of 1931, so in 1932, we were unable to find any *protodice* of the early broods and only on July 8, 1932 did we see a worn female (144) fluttering amongst the weeds. On July 17 and 20 we took four fresh females (145 to 148) and by the end of that month some specimens of both sexes were captured (1 to 6 and 149 to 157). In early August we saw very few on the wing, but from the 10th to the 21st they again increased (7 to 34, 158 to 168). We believe that the scarcity both in early and late August was due to the waves of heat, during July 9 to 14 (max. 92°, min. 68°) and August 4 to 10 (max. 90°, min. 71°), killing most of the larvae.

From August 11 to 24 the climate was suitable for the development of the caterpillars, and we found many adults (42 to 88, 170 to 213) in early September. From September 18 to 25 the adults again became plentiful (89 to 113, 214 to 244) because the larvae, from eggs laid during the latter days of August and early September met with the most suitable climatic conditions of 7th to 19th when the temperature seldom reached 80°. After September 25, the nights became cool (about 53°) which retarded the development of the chrysalids, and consequently during the period from the 26th to October 3, we took only few adults (114 to 134, 245 to 273), but after that disturbing weather set in. The last specimens we found, October 14 to 18 (135 to 143, 274 to 280), were flying notwithstanding cloudy skies; nor did we see any other butterflies on the wings. This we noted in contrast with the Octobers of 1930 and 1931, when, owing to the more propitious weather (mean 75°), *protodice* were quite abundant.

ON THE BREEDINGS OF PONTIA PROTODICE

During the seasons of 1932 we put into cages, with plants of wild pepper-grass (*Lepidium virginicum* Linn.), about 200 specimens of this species. Some of the females laid many eggs, on the leaves and stems, others only a few, some none at all; and we were often at loss to explain why no eggs were laid even though the whether conditions seemed so suitable. Many eggs were laid July 24 to 25, which hatched after four days, but as the temperature was high (max. 90°, min. 71°), all the larvae died within two or three days. About sixty eggs, laid by a worn female on July 26 hatched on the 29th and met with better climatic conditions, as the temperature seldom, and for a short time only, rose to 85° to 88° with a minimum below 70°. Only a few of these larvae died and most of them grew rather rapidly, about twenty matured August 4 at temperatures of 74° to 87° and a few hanged but the temperature suddenly rose to 90° and all the larvae rotted.[8]

In early August adults on the wing were scarce, and the few specimens we put in the cages neither mated nor laid eggs. However on August 20 to 21, we caged nine males and nine females, and from these, during the four to six remaining days of their life, we secured several hundred eggs which hatched after four days. Although the temperature rose to 90° on August 27, the wind was strong (28 miles per hour) and a shower cooled the air, so only a few larvae died. The morning of August 31 came with a temperature of 75°, with the larvae very fully grown, apparently preparing to pupate, but the heat increased to 95° or 97°, killing all of them during the day.

From September 1 to 5 it was very hot. The butterflies fluttered strongly in the cages, but soon died without laying eggs.

The results of these breedings having been so poor, when the species became scarce at mid-September, we preferred to mount the specimens instead of placing them in cages for their eggs. What happens to the larvae in captivity certainly does not occur in nature where not all the larvae die during the waves of heat, as some no doubt find shelter among the vegetation, getting the beneficial effect of the wind and dew.

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[8] The excessive heat during larval development and while hanging preparing to pupate, seems to be fatal, causing them to become soft and limp, apparently rotting.

On September 22 we placed five old females in the cage. These laid eggs, many of which in summer, when the mean temperature was about 80°, would have hatched in four days, now hatched after seven days the mean temperature being 62° to 68°. These larvae did not grow so rapidly as in summer, and, to observe better the effect of the lower temperature, we put them out of the window. However on the morning of October 2 we found that all had been eaten by cockroaches which had climbed along the wall of the building.

On October 10 a female laid 35 eggs, which were eight days in hatching because the temperature had sometimes dropped to 41° or 43°. These larvae grew slowly, and were still small when we left Philadelphia October 28.

In the country we found many larvae of this species which we brought home, but most of them died from the excessive heat. Some, however, produced chrysalids from which adults emerged in eight to twelve days when the heat was intense, and in ten to fourteen days when the temperature was moderate. I believe that the life-cycle of this species, when the larvae grow rapidly under the most propitious summer conditions, is about twenty days.

The most important factor controlling the abundance of *protodice* during the summer of 1932, was the heat, not starvation, as the food-plant was always plentiful owing to the frequent showers. None of the larvae we found in the country were affected by parasites. On the other hand, the controlling factor during the winters of 1931 and 1932, was no doubt the severe cold, killing the chrysalids in such open places as the Parkway. We feel sure that if any had survived at that place we should have seen adults, as we collected there for some hours every day during the spring and early summers of those years. That the species became abundant later in the season, was no doubt due to dispersal from other places where the chrysalids had in some way secured protection from the cold. These sheltered localities were probably far from the Parkway because both in 1931 and 1932 that species spent about two months in reaching our collecting grounds after the beginning of the good season.

III. Forms of Pontia protodice

We have never taken any specimens of the earliest broods of this species and can therefore consider only the forms which occurred from July to October of 1932, recording both the ordinals of the specimens in the collection and their dates of capture.

Size.—Most of the specimens taken in 1932 have a wing expanse of 35 to 40 mm.[4]

In the following tables[5] we record the specimens which are either smaller or larger than the more frequent sizes.

Males Smaller than 35 millimeters

4	Jul.	25	61	Sep.	4	96	Sep.	22	109	Sep.	25
5	“	27	64	“	4	103	“	24	110	“	25
18	Aug.	13	68	“	4	104	“	24	126	Oct.	2
23	“	16	76	“	5	105	“	24	142	“	15
32	“	21	85	“	9	106	“	24			
33	“	21	95	“	21	107	“	25			

Number 96 is the smallest (30 mm.).

Females Smaller than 35 millimeters

148	Jul.	20	186	Sep.	5	237	Sep.	24	277	Oct.	15
183	Sep.	5	195	“	6	243	“	25			

Number 237 is the smallest (31 mm.).

Males Larger than 40 millimeters

20	Aug.	13	58	Sep.	4	83	Sep.	7	120	Sep.	29
24	“	16	59	“	4	84	“	7	122	Oct.	1
50	Sep.	2	71	“	4	91	“	18	128	“	2
53	“	3	72	“	5	101	“	24	130	“	2
57	“	3	78	“	7	117	“	29	141	“	15

Number 101 is the largest (45 mm. with wing length of 25 mm.). However it is much smaller than that figured by Boisduval and LeConte,[6] which figure shows an expanse of wings of 54 mm. and wing length of 28 mm. in the typical figure.

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[4] All measurements are taken from tip to tip of the fore wings of specimens uniformally set with the anal margin of the fore wings perpendicular to the axis of the body.

[5] The first column of these tables is the ordinal of the specimen; the second column that of the date of capture.

[6] These figures of the male and female, I cite as the “type” or “typical specimens” in the present paper.

Females Larger than 40 millimeters

144	Jul.	8
145	"	17
146	"	20
151	"	22
154	"	25
172	Sep.	3
174	Sep.	5
203	"	7
204	"	7
205	"	9
218	"	19
219	"	19
227	Sep.	22
231	"	22
232	"	22
238	"	24
254	Oct.	2
255	"	2
259	Oct.	3
260	"	3
261	Oct.	8
270	"	10
275	"	14
279	"	15

The largest females are 144 and 255 (45 mm., with wing length of about 25 mm.). They look smaller than the typical female, the figure of which is 49 mm. in width, and wing length of 25 mm., about the same as our largest females. In the type-figures the shape of the wings is more elongate than in most specimens I have seen from Philadelphia.

Shape of the wings.—The specimens having their wings almost as elongate as in the typical figures, were very scarce in summer, while in the fall the males and most females had such type of wings.

Males with Elongated Wings

28	Aug.	17
50	Sep.	2
54	"	3
63	"	4
69	"	4
75	"	5
102	"	24
118	Sep.	29
125	Oct.	2
128	"	2
129	"	2
130	"	2
131	"	9
132	"	9
133	Oct.	9
134	"	10
135	"	14
136	"	14
137	"	14
138	"	14
139	"	14
140	Oct.	15
141	"	15
142	"	15
143	"	18

Specimen 141 most resembles the type-figure, but is smaller. On the underside also the pattern is type-like.

Females with Elongated Wings

147	Jul.	20
148	"	20
152	"	24
153	"	24
162	Aug.	13
181	Sep.	4
184	"	5
210	"	11
230	"	22
239	"	24
246	Sep.	29
250	Oct.	1
252	"	2
254	"	2
262	"	8
261	Oct.	8
263	"	8
268	"	10
276	"	14
280	"	18

Specimens 153 and 250 have the most elongated wings, and look very much like the type-figure, also as to pattern, but are smaller.

I have noticed, not only as regards *protodice*, but many other Rhopalocera, that when the crysalids remain for some time under low temperature, the shape of the wings of their adults is more elongated. However, on the contrary, I have taken some specimens with elongated wings during the heat-waves.

Tone of the black pattern.—The pattern is almost always deep black, and only in a comparatively few specimens does it appear paler.

Males with Paler Pattern

64 Sep. 4
80 " 7
103 Sep. 24
109 " 25
110 Sep. 25
119 Sep. 29

Females with Paler Pattern

158 Aug. 11
159 " 11
178 Sep. 4
180 Sep. 4
183 " 5
190 " 5
195 Sep. 6
198 " 6
212 " 14
223 Sep. 21
232 " 22
256 Oct. 3

Pattern of the upper side.—In most of the specimens the black pattern of the upper side is of moderate extent. Consequently we kept and mounted only the majority of those showing either a reduced or extensive pattern.

Males with a Reduced Pattern on the Fore Wings

10 Aug. 11
14 " 12
37 " 29
40 " 31
43 Sep. 1
45 " 1
52 Sep. 2
62 " 4
80 " 7
92 " 18
99 " 24
105 " 24
106 Sep. 24
107 " 25
108 " 25
109 " 25
110 " 25
116 " 26
119 Sep. 29
123 Oct. 1
131 " 1
133 " 9
135 " 14
137 " 14

These males look different from the type-figure, not only as to the dots which are smaller, but also because the spot near the lower margin of the fore wings, which is large in the typical figure, is missing in the above recorded specimens. In this respect they resemble *vernalis* as figured by Edwards.[7]

Males with an Extensive Pattern on the Fore Wings

1 Jul. 21
7 Aug. 10
17 " 13
22 " 15
24 " 16
28 Aug. 17
30 " 19
31 " 19
34 " 21
35 " 26
44 Sep. 1
53 " 3
72 " 3
77 " 7
88 " 11
102 Sep. 24
120 " 29
139 Oct. 14
140 " 15

These males resemble the type-figure in general, but 120 is the most typical on both sides, having also two small spots on the upper side of each hind wing. However, it is smaller and has black dusting at the base of the wings, while in both the type-figure and most summer specimens that portion of the wings is white.

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[7] Butterf. N. Am., I, Pieris, ii, figs. 1–4, (1871).

Males with Traces of Gray Spots on the Hind Wings

24	Aug.	16
25	"	16
28	"	17
29	"	19
30	Aug.	19
51	Sep.	2
53	"	3
67	"	4
83	Sep.	7
88	"	11
98	"	24
112	"	25
120	Sep.	29
121	"	30

This is the character which is so characteristic of the typical figure of the male.

Males with a Faint Zig-zag Pattern along the Margin

77	Sep.	7
98	"	24
100	"	24
112	"	25
117	"	29
120	"	29
121	Sep.	30
122	Oct.	1
124	"	1
125	"	2
128	"	2
129	"	2
130	Oct.	2
131	"	9
132	"	9
133	"	9
134	"	10
135	"	14
137	Oct.	14
138	"	14
142	"	15

Specimens with this character were found in autumn. Only number 77 was taken when the temperature dropped after a wave of heat. The faint pattern on the upper side of the hind wings is but the shadow of the pattern of the under side; however there are some specimens as 101, 139, 141 and 143, with a well outlined pattern beneath, but which appear white above.

Males with Thick Dusting at the Base of the Wings

77	Sep.	7
102	"	24
117	"	29
118	"	29
120	Sep.	29
124	Oct.	1
128	"	2
130	"	2
133	Oct.	9
134	"	10
135	"	14
138	"	14
139	Oct.	14
140	"	15

Almost all the males which emerged during the hot period had only a few gray scales at the base of the wings on the upper side; but as soon as the temperature dropped September 29 to 30 of 1932, most of the males had more or less intense suffusion near the body. The specimens recorded in the table are only a few of those which we caught, as, owing to the bad weather in October, we did not collect every day, and as most of those we caught were frayed, we did not keep them.

The Palest Females of the Set

145 Jul. 17
148 " 20
158 Aug. 11
159 " 11
177 Sep. 4
183 " 5
187 " 5
195 " 6
196 Sep. 6
201 " 7
212 " 14
214 " 17
223 " 21
229 " 22
232 " 22
240 " 25
241 Sep. 25
242 " 25
245 " 29
247 " 30
248 " 30
250 Oct. 1
251 " 2
252 " 2
256 Oct. 3
257 " 3
266 " 9
267 " 10
268 " 10
279 " 15
280 " 18

These light females resemble the type-figure, being however either smaller (279) or very small (183). As to the wing pattern, the most type-like is perhaps 266.

The Darkest Females of the Set

151 Jul. 22
161 Aug. 12
166 " 17
168 " 17
175 Sep. 4
182 " 4
186 " 4
193 " 5
194 Sep. 5
203 " 7
213 " 14
228 " 22
259 Oct. 3

The typical female, figured by Boisduval and LeConte, looks light, having only a trace of gray dusting at the base of the wings above. The thirteen recorded above are very different from the type-figure because the black dusting covers most of the four wings above. The most melanic specimen taken is 203. Comparing the data of the two foregoing tables one sees that both the palest and darkest specimens emerged almost on the same days during the season.

Pattern of the under side.—The pattern of the under side of the fore wings varies so little, in both sexes, that we find no character worthy of note, only the dark suffusion at the base being more or less extensive. Of the hind wing, however, the variation is interesting, and we note the following:

Males with the most Reduced Pattern on the Hind Wings Beneath

4 Jul. 25
5 " 27
6 " 29
9 Aug. 11
11 Aug. 12
13 " 12
14 " 12
15 " 13
16 Aug. 13
19 " 13
55 Sep. 3
56 " 3
59 Sep. 4
80 " 7
87 " 10

Numbers 4 and 16 are remarkable, being quite white on the under side.

Males with the most Extensive Pattern on Hind Wings Beneath

44	Sep.	1	114	Sep.	26	131	Oct.	9	141	Oct.	15
82	"	7	117	"	29	132	"	9	142	"	15
92	"	18	120	"	29	135	"	14	143	"	18
101	"	24	129	Oct.	2	137	"	14			
102	"	24	130	"	2	139	"	14			

From July to September 6 of 1932, the mean daily temperature was about 80°, and all the males we caught had a faint pattern on the under side of the hind wings. The exceptions are represented by specimens 35 and 41, taken on the 26th and 31st of August respectively, which have a pale zig-zag band along the margin; and by 44 which is a male with the best outlined pattern of the whole set. This last specimen was taken September 1, the hottest day of the year 1932 (maximum 97°), and the remarkable pattern of the under side of the hind wings resembles that of the typical figure of the form *vernalis* Edwards. On September 7 the temperature decreased, and until the 23d its mean was about 70°. Most of the males, emerging during that period, had retained the features of the summer ones but we also found three (82, 86 and 92) which had the veins as well marked as in the type-figure of the male. From September 24 to 29 the temperature continued to decrease and all the males, except 115 which is like the summer ones, had the pattern of the under side more or less well defined. On September 30 the temperature dropped to the minimum of 45°, but on October 1 and 2 the weather was lovely, and we took many males having the veins well outlined, but thin, as in the typical figure. After October 3 the weather became unsettled, and most of the males were type-like. The males 139 and 141 look still darker than the type-figure, being almost as thickly dusted as in Edwards' figure of *vernalis*. Only one of the October males (127) is as light on the under side as most of the summer ones.

Females with the Pattern most Reduced on Hind Wings Beneath

146	Jul.	20	159	Aug.	11	193	Sep.	5	210	Sep.	11
147	"	20	163	"	13	195	"	6	211	"	11
151	"	22	166	"	17	196	"	6	212	"	14
152	"	24	174	Sep.	3	204	"	6	232	"	22
157	"	29	185	"	5	205	"	9	244	"	25
158	Aug.	11	187	"	5	208	"	11			

The ground color of the under side of the females is pale yellow, not white as in the males. Those which appear to be the deepest yellow, with the veins not dusted with gray scales, are 152, 163, 185, 197, 208, 210 and 211.

Females with the Pattern most Extensive on Hind Wings Beneath

172	Sep. 3	228	Sep. 22	268	Oct. 10	278	Oct. 15
200	" 6	229	" 22	273	" 10	280	" 18
218	" 19	246	" 29	274	" 14		
221	" 21	263	Oct. 8	275	" 14		
224	" 21	264	" 8	276	" 14		

We cannot say which of these females most resemble the type-figure because Boisduval and LeConte did not figure the under side of this sex. The darkest of the set is 278 which is like that of Edward's figure 4 of the form *vernalis.*

STUDIES IN THE NYSSONINE WASPS

(GORYTINI: SPHECIDAE: HYMENOPTERA)

I. The Species of Psammaletes, a New Subgenus of Hoplisoides

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During the past few years I have had an opportunity to study a large amount of material of the *Gorytes* complex, among which been the genotypes of practically all the various genera and subgenera that have been erected from time to time in this group. Out of this has grown a reclassification of the genera, the results of which will be published in the near future. Recently there has come to hand a specimen of a new species which it seems desirable to describe now. Inasmuch, however, as this species belongs to what I consider to be a new subgenus of *Hoplisoides* Gribodo, a description of it is offered here with a revision of those species which I consider should be relegated to it.

PSAMMALETES[1] new subgenus

1916. *Hypomellinus* Mickel (not of Ashmead), Trans. Amer. Ent. Soc., XLIII, p. 403.

1918. *Hypomellinus* Mickel (not of Ashmead), Univ. Nebr. Stud., XVII, p. 395.

Form robust; eyes parallel in the female, subparallel in the male, never strongly converging toward the clypeus which is transversely rectangular and two to two and one-half times as broad as long; antennae long and filiform, inserted low on the face just above the dorsal margin of the clypeus; temples broad and well developed; thorax more or less coarsely punctate, mesopleura with the omauli and sternauli present and well developed and with the lower portion of the episternal suture obsolete, the upper portion, which is often more or less obsolescent vertical or almost so and curving back into the episternaulus which is likewise often more or less obsolescent and ends posteriorly in the meso-metapleural suture, the upper portion of the episternal suture and the episternaulus thus forming a serial suture or furrow; propodeum with the dorsal basal triangular area present, well

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[1] (Ψάμμος, sand + ἀλήτης, a wanderer.)

defined and usually coarsely longitudinally striate, remainder of propodeum usually coarsely punctate, never rugose; stigmatal groove, if present, developed only in part for a short distance just below the spiracle; abdomen more or less coarsely punctate, the first segment strongly coarctate, males with only six abdominal segments visible, last tergite without a pygidial area, last sternite terminating in a single stout median spine, and with distinct concealed hair-brushes along the anterior margins of the fourth and fifth abdominal sternites; females with a distinct pygidial area; middle tibiae with two calcaria apically; fore and middle coxae of both sexes internally at apex with two strong bristles; females with a distinct tarsal comb of rather short stiff bristles or thorns, the last segment of the fore tarsi strongly swollen and the pulvillus correspondingly large, last tarsal segment and pulvilli of the middle and hind tarsi small and normal sized; fore wings long and narrow, usually pictured or infumated, never entirely clear hyaline, marginal cell narrow, elongate, lanceolate, third submarginal cell large and rhomboidal, first discoidal cell narrow, elongate; hind wings with the cubitus and transverse median veins interstitial or nearly so.

GENOTYPE: *Gorytes bigeloviae* Cockerell & Fox.

Psammaletes is readily separable from *Hoplisoides* (*s. s.*) by the coarctate first abdominal segment. The two species which Mickel in 1916 and 1918 (*loc. cit.*) placed in *Hypomellinus* Ashmead belong to this group. I have seen the types of *Gorytes rufocinctus* Fox and *Gorytes mellinoides* Fox, the genotypes respectively of Ashmead's genera *Hypomellinus* and *Mellinogastra*, and found them to be indubitably congeneric with *Gorytes bicinctus* (Rossi), the genotype of *Lestiphorus* Le Peletier. Ashmead's names, accordingly, must be recorded as synonyms of Le Peletier's earlier name. *Psammaletes*, however, bears only a superficial resemblance to *Lestiphorus*; from which it may be readily distinguished by the following key.

Males with seven abdominal tergites clearly visible, the eighth sternite bifid apically; females with the pygidial area poorly defined, at most usually present only apically; sternauli obsolete anteriorly; puncturation of body fine; first abdominal segment strongly coarctate......... *Lestiphorus* Le Peletier

Males with only six abdominal tergites visible, the eighth sternite terminating in a stout median spine, the fourth and fifth sternites with distinct concealed hair brushes medially along their anterior margins; females with a distinct, well-defined, triangular pygidial area; sternauli distinct and well developed their entire length; puncturation of body coarse; first abdominal segment sessile or coarctate.................. *Hoplisoides* Gribodo

Subgenera of *Hoplisoides*.

a. First abdominal segment broadly sessile with the second *Hoplisoides* Gribodo.

aa. First abdominal segment strongly coarctate apically *Psammaletes* new subgenus.

Rohwer in 1921[2] regarded *Hoplisoides* as merely a subgenus of *Hoplisus* Le Peletier 1832 [= *Gorytes* Latreille 1804]. Moreover, he questioned its validity as a discrete group. However, a careful study and comparison of material of *Gorytes aglaia* Handlirsch [= ? *Hoplisoides intricans* Gribodo] with *Gorytes quinquecinctus* (Fabr.), the genotypes respectively of *Hoplisoides* Gribodo 1884 and *Gorytes* Latreille 1804, as well as a number of congeners of each, has revealed congeries of basic characters wherein they differ from each other. As a consequence, *Hoplisoides* unquestionably should be accorded a rank co-ordinate with that of *Gorytes*. Superficially the two genera have much the same general facies but they may be readily separated from each other by the following table of contrasting characters.

Mesopleura with the lower portion of the episternal suture present, horizontal, running backward directly from the omaulus[3] and forming a serial suture or furrow with the episternaulus, the latter terminating posteriorly in the meso-metapleural suture, the upper portion of the episternal suture obsolescent or obsolete, when present usually represented only by a furrow which descends more or less vertically from below the anterior wing base and is often abruptly obsolete just before its junction with the straight serial episternal-episternaulal suture or furrow; meso- and metapleura shining, highly polished, usually impunctate; metapleura usually subtriangular, the sides rarely parallel; stigmatal groove present and well developed its entire length; propodeum coarsely, rugosely sculptured (*Gorytes* s.s.) or shining, highly polished and impunctate (*Pseudoplisus* Ashmead), never coarsely punctured; inner margins of the compound eyes converging distinctly toward the clypeus which is as long as broad, rarely broader than long but in that case not over one and one-half times as broad as long, the antennae situated high, toward the middle of the face; cubitus of the hind wing arising distinctly before the transverse median vein, rarely interstitial; abdomen shining, highly polished and impunctate or finely punctate, rarely with coarse heavy puncturation; males with seven abdominal tergites clearly visible, the eighth sternite terminating in a median attenuate process which apically may be either acute, truncate and provided apically with a series of small bristles, or retuse, the anterior margins of the fourth and fifth sternites devoid of any concealed hair-brushes; females with a tarsal comb composed of stiff, rather short, thorn-like bristles .... *Gorytes* Latreille

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[2] Proc. U. S. Nat. Mus., LIX, p. 411.

[3] *Omaulus*: the furrow or groove descending vertically from below the prothoracic tubercles; the epicnemial groove of some authors.

Mesopleura with the lower portion of the episternal suture obsolete, the upper portion, which is often more or less obsolescent, vertical or almost so and curving backward into the more or less obsolescent horizontal episternaulus which ends posteriorly in the meso-metapleural suture, the upper portion of the episternal suture and the episternaulus thus forming a right-angled serial suture or furrow; meso- and metapleura coarsely punctate and only slightly shining, occasionally impunctate or practically so and then shining and highly polished; metapleura usually more or less parallel sided and subrectangular; stigmatal groove absent, or if rarely present, then developed for only a short distance just below the spiracle; propodeum coarsely punctate, never clathrately rugose; inner margins of the compound eyes of both sexes parallel or subparallel, never converging strongly toward the clypeus which is more or less transversely rectangular and usually twice as broad as long, the antennae situated low on the face, just above the dorsal margin of the clypeus and on or about on a line drawn between the lower margins of the compound eyes; cubitus of the hind wing interstitial or nearly so with the transverse median vein; abdomen usually strongly and coarsely punctured; males with only six abdominal tergites visible, the seventh retracted beneath the sixth, the eighth sternite terminating in a stout median spine, the anterior margins of the fourth and fifth sternites provided with distinct concealed hairbrushes medially; females with a tarsal comb usually composed of rather long, flattened, flexible bristles ......
Hoplisoides Gribodo

Key to the Species of Psammaletes.[4]

1. Males 2
   Females 3
2. Head and thorax rufous; first discoidal cell of fore wing with a fuscous cloud .... *crucis* (Ckll. & Fox)
   Head and thorax black; first discoidal cell of fore wing clear hyaline. *bigeloviae* (Ckll. & Fox)

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[4] *Gorytes mexicanus* Cameron (Biol. Centr.-Amer. Hymen., II, p. 76, pl. 5, fig. 15, 1890) described from a female from Temax in northern Yucatan may belong to *Psammaletes,* but I have seen no authentic material of this species.

3. Head and thorax rufous; fore wing strongly infuscated save for a pallid area in the first submarginal cell under stigma; pygidium shining, highly polished and with a few scattered punctures; western species. *crucis* (Ckll. & Fox)

Head and thorax black; fore wing clear hyaline save for a fuscous cloud in the marginal and submarginal cells; pygidium opaque, coarsely, longitudinally striato-punctate; eastern species .... *pechumani* new species

Psammaletes bigeloviae (Cockerell & Fox)

1897. *Gorytes bigeloviae* Cockerell & Fox, Proc. Acad. Nat. Sci. Phila., XLIX, p. 139. (♂.)

The female of this species is still unknown. It is not likely that the following species will prove to be the opposite sex of this, for aside from the fact that their probable geographic ranges are so different, *Ps. bigeloviae* has the costa and stigma of the fore wing brownish-black in colour, whereas in *Ps. pechumani* these areas are a light tawny colour.

Distribution.—NEW MEXICO: 1♂, Agricultural College, Messilla Valley, September 12, 1895, (T. D. A. Cockerell; on flowers of *Bigelovia wrightii*), [A.N.S.P. Type no. 10061]. ARIZONA: 1♂, (no data), [A.N.S.P].

Psammaletes pechumani [5] new species

♀. 13 mm. long. Black, the following chrome yellow: mandibles except the apices which are dark red and a small black spot on the anterior basal angle, labrum, clypeus save a transverse black stripe on upper half, scape anteriorly, inner orbits from vertex to clypeus with a broad stripe each of which is connected below with the other by a broad transverse stripe at the level of the antennal sockets, a transverse stripe on the pronotum dorsally, pronotal tubercles, a large elongate, perpendicular subobovate spot on the mesopleura just behind the pronotal tubercles and below the anterior wing bases, mesonotum with a small spot laterally on each side just above and behind the tegulae, posterior half of the scutellum, a large ovate spot on each laterocaudal angle of the propodeum, first four abdominal tergites fasciate apically, second and third sternites with an elongate cuneate stripe laterally on each side, the stripe continuous laterally with the corresponding tergal fascia, fore and middle coxae basally, fore and middle trochanters apically and fore femora with a stripe beneath; the following portions rufous: fore, middle and hind femora apically, and fore and middle femora internally, fore, middle and hind tibiae and tarsi, except the last segment of the middle and hind tarsi which is fuscous, and

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[5] Dedicated to its collector, Mr. LaVerne L. Pechuman.

pedicel and flagellum beneath. Clypeus laterally, and front below at the antennal insertions, silvery puberulent; fifth and sixth abdominal segments with short, sparse, rather stiff, aeneous pubescence.

Wings with the costa and stigma of the fore wing fulvous, remaining veins dark brown; marginal cell, the submarginal cells, except the posterior quarter of the third, to wing apex and the anterior fourth of the first discoidal cell, infumated fuscous; remainder of wing clear hyaline. Marginal cell of fore wing long, narrow and lanceolate, third submarginal cell large and rhomboidal; cubitus and transverse median vein of the hind wing interstitial.

Head: front, vertex and upper half of the clypeus opaque, with a basic acupuncturation upon which is superposed a coarser, heavier, scattered series of punctures; temples shining, with scattered rather fine sparse puncturation; apical half of the clypeus shining, highly polished and impunctate. Clypeus transversely rectangular, two and one-half times as wide as long, its lateral angles broadly rounded, with a distinct transverse inflation medially along the crest of which is a transverse row of well separated strong bristles, apically with a semitranslucent flange which is quite narrow medially but rather broad laterally; labrum subsemicircular, apical margin with a row of close-set, strong bristles; antennae long and filiform, scape cylindrical, first flagellar article subequal in length to the scape and pedicel combined, one and one-half times as long as the second flagellar segment; inner margins of the eyes parallel; postocellar line slightly longer than the ocellocular line, posterior ocelli connected behind by a faint arcuate furrow.

Thorax shining, mesonotum, mesopleura, scutellum and postscutellum with coarse scattered puncturation heavier than that of head, pronotum dorsally, metapleura and anterior portion of the lateral faces of the propodeum impunctate, shining and highly polished; suture between the mesonotum and scutellum simple, not foveolate; dorsal basal triangular area of propodeum with coarse, parallel longitudinal striae, radiating slightly apically; dorsal and posterior faces and caudal half of lateral faces of propodeum with coarse punctures which are well separated on dorsal and lateral faces, but close and often semiconfluent on posterior face; stigmatal groove slightly developed for a short distance just below the spiracle, obsolete on lower half of propodeum; mesopleura with the sternauli rather weak anteriorly near their junction with the omauli and with the serial episternal-episternaulal groove practically obsolete.

Abdomen with the first segment strongly coarctate; tergites very finely acupunctate and with a superposed series of stronger punctures similar in quality to those of the head but much more closely set; sternites shining, highly polished, without acupuncturation but with a coarse, irregularly disposed, heavy puncturation which is strongest and densest on the second sternite and progressively weaker and more scattered on each succeeding sternite; fourth and fifth tergites laterally on each side on the basal portion covered by the preceding tergite with an ovate iridescent patch apparently very minutely and transversely striate; pygidium strongly, longitudinally striato-punctate.

Legs: fore tarsi with a comb of rather short, stiff, thorn-like bristles; each fore and middle coxa interno-apically with two stout bristles, one of which is rather long; last segment of the fore tarsi strongly swollen and the pulvillus correspondingly quite large; last tarsal segment and pulvilli of the middle and hind tarsi small and normal size; middle and hind tibiae and hind metatarsi rather strongy spinose.

♂ unknown.

Holotype.—♀; Fairmount and Kearney Avenues, The Bronx, New York, New York. August 1, 1935. (L. L. Pechuman). [Academy of Natural Sciences of Philadelphia, Type no. 4170].

The livery of this species resembles very closely that of *Ps. bigeloviae* (Ckll. & Fox), of which only the male is known. I do not believe, however, that this is the female of that species, for, as pointed out above, in addition to the very different geographic localities from which each is known, *Ps. pechumani* differs from *Ps. bigeloviae* in the pattern and colouration of the fore wings. Nor is it likely that this species is one that has been introduced into this country inasmuch as *Psammaletes* is known only from the Nearctic region. The congeners of *Ps. pechumani* are still known only from localities west of Omaha, Nebraska and there is a bare possibility that it may have been accidently introduced and established here in the east; I do not, however, think that this is a very probable assumption. The discovery of this species in a metropolitan area that should have been well collected by now and the entomological fauna of which should be well known is extremely interesting. Its type locality is at present a vacant lot in the Bronx, near the cemetery where the celebrated Jafsie conducted his negotiations with the kidnappers of the Lindbergh baby. Inasmuch as it is within one of the largest metropolitan areas in the world, it is not improbable that within a few years it may be impossible to obtain exact topotypic material, for the original site will no doubt be defaced by an unsightly row of houses, a filling station, or some other equally unpleasant and inevitable concomitant of our modern civilization.

Psammaletes crucis (Cockerell & Fox)

1897. *Gorytes crucis* Cockerell & Fox, Proc. Acad. Nat. Sci. Phila., xlix, p. 140. (♀.)
1916. *Hypomellinus venustus* Mickel, Trans. Amer. Ent. Soc., xliii, p. 403. (♂.)
1916. *Hypomellinus tricinctus* Mickel, Trans. Amer. Ent. Soc., xliii, p. 404. (♀.)
1918. *Hypomellinus venustus* Mickel, Univ. Nebr. Stud., xvii, p. 395. (♂.)
1918. *Hypomellinus tricinctus* Mickel, Univ. Nebr. Stud., xvii, p. 396. (♀.)

A paratype of *Hypomellinus tricinctus* Mickel before me agrees in all essential respects with the type of *Gorytes crucis* Ckll. & Fox. I have seen no authentic material of *Hypomellinus venustus* but Mickel's description of it coincides very closely with that of *Hypomellinus tricinctus* and with the specimen of the paratype of the latter before me. This, together with the fact that Mickel records both of his species from the same locality with practically the same data for each, has led me to conclude that they are very probably merely the opposite sexes of the same species. *Ps. crucis* has the widest known distribution of any of the species of the group.

Distribution.—New Mexico: 1♀, Las Cruces, August 12, (C. H. T. Townsend), [A.N.S.P. Type no. 10062]. Nebraska: 1♂, Harrison, August 12, 1912, (R. W. Dawson), [Univ. Nebraska]; 2♀♀, Omaha, August 5, 1913, (L. T. Williams; on flowers of *Chamaecrista fasciculatum*), [Univ. Nebraska], 1♀, Omaha, August 3, 1914, (L. T. Williams; on flowers of *Chamaecrista fasciculatum*), [A.N.S.P.], 1♂, Omaha, July 14, (L. T. Williams; on flowers of *Chamaecrista fasciculatum*), [Univ. Nebraska].

The species which C. F. Baker described in 1907 as *Hypomellinus flavicornis*[6] is neither a *Psammaletes* nor a *Lestiphorus*, but belongs to still another genus.

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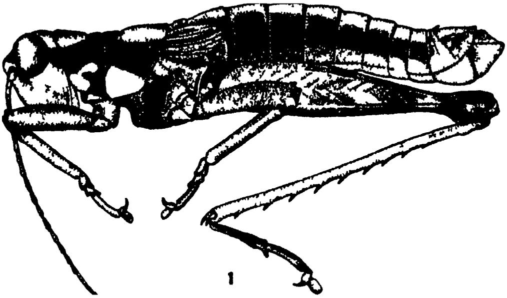
[6] Invertebrata Pacifica, i, p. 162.



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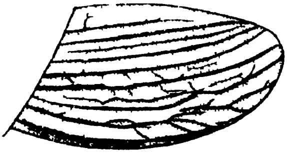

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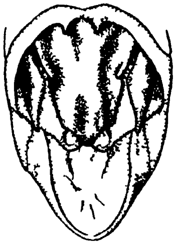

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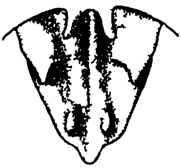

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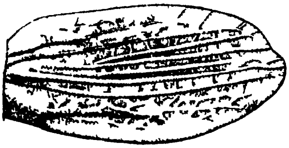

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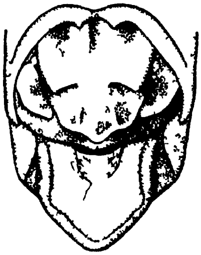

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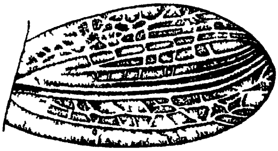

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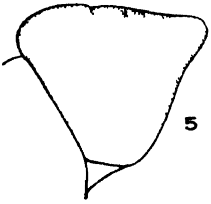

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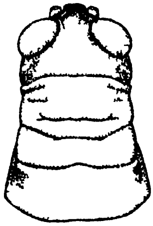

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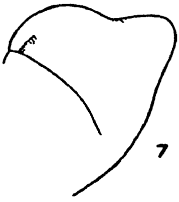

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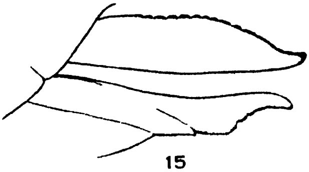
REHN AND REHN—NEARCTIC MELANOPLI



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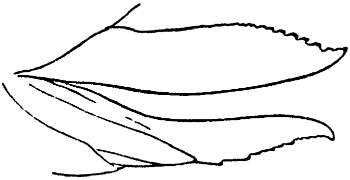

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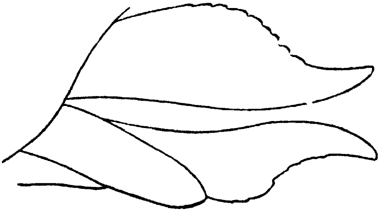

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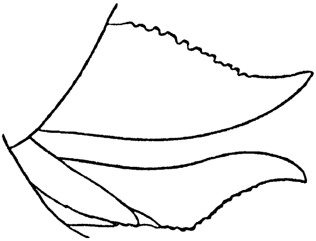

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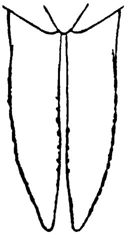

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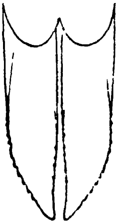

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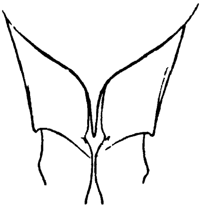

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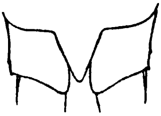

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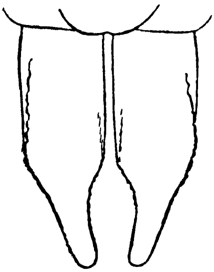

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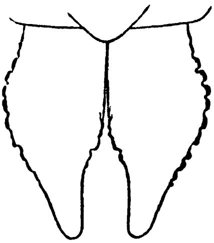

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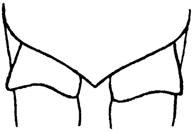

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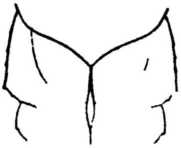

22

REHN AND REHN—NEARCTIC MELANOPLI

STUDIES IN THE TENEBRIONID TRIBE TRIOROPHINI

A MONOGRAPHIC REVISION OF THE SPECIES BELONGING TO THE GENUS STIBIA (COLEOPTERA)

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(Plates III to V)

In 1870, Dr. Geo. Horn founded the genus *Stibia* to receive a species from Lower California and which he named *puncticollis;* a small series was collected by Mr. Wm. M. Gabb. In 1874, Dr. Horn received two other new species which he described as *ovipennis* and *hispidula,* referring them to the genus *Stibia.* A single specimen of *puncticollis* was secured by Dr. Gustav Eisen in 1893,[1] when with an expedition of the California Academy of Sciences to the region of San Jose del Cabo, Baja California. This specimen was lost in the fire of 1906, following the earthquake, which destroyed the Academy and greater part of San Francisco.

In 1907, Thos. L. Casey removed *ovipennis* Horn and *hispidula* Horn from the genus *Stibia* and placed them in new genera which he characterized to receive them, namely: *Micromes* for *ovipennis* and *Oxygonodera* for *hispidula.* The author in 1923,[2] described three new species from specimens collected on the Islands in the Gulf of California, and also, two other species in 1925, from material collected by the expedition of the Academy to the Guadalupe and other islands off the west coast of Lower

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[1] Proc. Calif. Acad. Sci., (2), IV, p. 346, Sept. 28, 1894.

[2] Proc. Calif. Acad. Sci., (4), XII, pp. 237–240, July 10, 1923.

California in July and August of 1922.[3] Thos. Casey in 1924, obtained a specimen of a species from the vicinity of Tucson, Arizona and placed it in the new genus *Eutriorophus* Casey.

The largest collection of specimens belonging to the genus *Stibia* Horn, yet made, was secured by the Expedition of the California Academy of Sciences to the Gulf of California in 1921.[4] Our knowledge of the distribution of the species was greatly increased by that expedition and is of particular interest to the student of faunal areas and distribution, for the species of *Stibia* Horn constitutes one of the characteristic Tenebrionid entities of the desert and semidesert regions which they inhabit.

The distribution of the species as at present known is as follows.—They occur on the following islands in the Gulf of California: Santa Catalina, Isla Partida, South Santa Inez, Sal si Puedes, San Lorenzo, Monserrate, Ildefonso, Asuncion, Tortuga, and Ceralbo. To the west in the Pacific Ocean: San Benito, San Martin, Natividad, San Geronimo and North Coronado. On the main land of Lower California, at Loreto, San Quentin, vicinity of Angeles Bay and Ensenada. The above are all Mexican possessions.

The type species occurs on Natividad Island, San Geronimo Island, northward at San Quentin, Ensenada, North Coronado Island and across the international boundary line into the United States to the Coronado peninsula at San Diego, California.

As at present known the most southern point of distribution of species of *Stibia* is Ceralbo Island, just north of the 24th parallel of latitude and just east of the 110 meridian; the most northern point on North Coronado Island, 20′ north of the 32nd parallel and 40′ east of the 113th meridian. The most northern points of occurrence in California are at Coronado, San Diego County and in the Yosemite National Park, the latter is also the most eastern point in the north, while the most eastern occurrence is in the vicinity of Tucson, and Pinal Mountains, Arizona. There is no known record of species having been taken on the main land in Sonora, Mexico. Species must occur there and our lack of knowledge is undoubtedly due to failure to collect in that region.

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[3] Proc. Calif. Acad. Sci., (4), XIV, pp. 328–330, Sept. 5, 1925.

[4] Proc. Calif. Acad. Sci., (4), XII, pp. 237–240, July 10, 1923.

TECHNIQUE

The technique used in the preparation of this revisional study has been the same as that used in the preparation of my Monographic Revision of the Eulabes.[5] All comparative and relative statements as regards size or length of parts, have been determined from camera lucida outlines as illustrated in the plates. The lens combinations have been that of a two-inch ocular camera lucida (Leitz) with objectives A (Zeiss), and those of 1, 2 and 3 inches focal distance (Bausch and Lomb), according to the size of the insect or parts and reduced to one-third in the plates. The determination of the relative dimensions of the head have been obtained by measuring from the post-temporal line or nuchal constriction just behind the tempora, to the angle of deflexion of the epistomal lobe anteriorly and across the point of greatest width.

ACKNOWLEDGMENTS

The author wishes to express his appreciation for the aid rendered by the following institutions: Museum of the California Academy of Sciences, which includes the collection of Dr. Edwin C. Van Dyke, Thos. Craig and that of the author. Academy of Natural Sciences of Philadelphia; Museum of Natural History, Balboa Park, San Diego and Los Angeles Museum, Exposition Park, Los Angeles. The following persons have negotiated the loans or contributed specimens or notes: E. T. Cresson, Jr., of the Academy of Natural Sciences of Philadelphia; Ian Moore and Albert Watson, of the Museum of Natural History, Balboa Park, San Diego and L. J. Muchmore of the Los Angeles Museum, and K. G. Blair, one of the custodians of the British Museum, London.

Subfamily TENTYRIINAE

The essential characters of the above subfamily are, that the mesocoxae are entirely inclosed by the mesosternum and metasternum, without any trochantin (Pl. III, fig. 11.). The ventral abdominal segments are entirely corneous, the third and fourth having no vestige of a posterior coriaceous margin.

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[5] Trans. Am. Ent. Soc., LVIII, p. 36, (1932).

Tribe TRIOROPHINI

Body elongate and wingless. Front of head variable, an epistomal lobe present (Pl. III.). Antennae slender. Eyes irregularly oval to ovate, not prominent and not coarsely faceted. Mentum very large, more or less transverse, sinuate at apex and more or less concealing the ligula and palpi. Mandibles bifid at tip, each with a porrect tooth. Elytra oval, embracing the sides of the body, the inflexed sides not wholly occupied by the epipleurae, the latter narrow and entire; with series of punctures. Scutellum distinct, always transverse and very obtusely truncate at apex, generally not entering between the elytra, but in line with the invariably distinct basal margin. Metacoxae more or less narrowly separated, intercoxal process of the first abdominal segment rounded to subtruncate at apex. Tibial spurs short. Anterior tibiae simple, not dentate, each with two spurs.

In the Revision of the Tenebrionidae of America North of Mexico, Dr. Geo. Horn assigned the present tribe to the Gnathosiini. Thos. Casey considered that the Triorophini[6] could be separated as a distinct tribe with decided propriety, on account of several characters pertaining to the American genera, these are: General facies and sculpturing, antennal structure and form of the scutellum, as well as having much more affinity with the purely North American Eurymetoponini, by way of the similarly geographically restricted Trimytini, than it has to the old world Gnathosiini.

Tribal Genital Characters

The material examined did not permit of the study of the genitalia in each species, on account of the scarcity or friability of the specimens. In the few attempts made the specimens fell apart as a result of the earlier maceration of the articulating membranes due to slowness in drying. By the examination of specimens collected in alcohol and having the retractile segments exposed, it was possible to notice some specific differences and also, a marked resemblance to those of the Auchmobiini. The salient tribal characters may be stated as follows:

Male. Aedeagus: Edeagophore (Pl. V, figs. 1, 2 and 3) relatively small, elongate, slender and more or less depressed. Apicale longer than the basale, inflexed sides more or less widely separated ventrally, as a result the genital fissure is widely open and the fossa large. Middle lobe ligulate, basale or valvifer short.

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[6] Proc. Wash. Acad. of Sci., IX, p. 431, Oct. 18, 1907.

Female. Aedeaga: Genital segment (Pl. V, figs. 1, 2 and 3.) more or less quadrato-triangular. Genital membrane rather widely exposed and not longitudinally rugulose. Valves chitinous, ovate as viewed laterally, rather rapidly narrowed apically; dorsal and ventral plates continuous laterally without margin, apices not produced and narrowly obtuse. Appendix (stylus) absent, fossae small giving origin to several setiform hairs. Dorsal plates narrower than the ventral, the latter divided by a transverse suture into two sclerites, an apical and a basal; the former triangular, the latter transverse. Basale elongate, at least twice as long as wide.

Comparative Epistomal Characters in the Triorophini

In the general differentiation of the species related to *Stibia,* it will be helpful to consider the epistomal characters in several genera as follows: *Orthostibia* Blais. (Pl. III, fig. 1.) has the front of the head distinctly trilobed, the middle or epistomal lobe is large and evenly arcuate at apex. *Pescennius* Champ. (Pl. III, fig. 3.) almost similarly trilobed, middle lobe prominent, the head pubescent and the frons strigose. *Triphalopsis* Blais. (Pl. III, fig. 4.) has the epistomal lobe very prominent and the lateral lobes retracted and small as in *Stibia* Horn; head pubescent, surface longitudinally and strongly strigose, the epistomal lobe transversely so. *Triphalus* Lec. (Pl. III, fig. 6.) has the epistomal lobe triangular and not deflexed. In all of the above genera the species possess mandibles with porrect teeth.

In *Triorophus* Lec. (Pl. III. fig. 5.) the epistomal lobe is very prominent, emarginate laterally at base, the emarginations being filled by a dorsal tooth on the base of each mandible, when the latter are in complete adduction; porrect teeth are also present and there is a rounded prominence or umbone on the frons at base of the lobe. In *Trimytis* Lec. (Pl. III, fig. 2.) the mandibles are without a porrect tooth, the epistomal lobe is very prominent anteriorly, trucate at apex and defined laterally at base by strong emarginations.

The above genera stand in marked contrast to the genus *Stibia* Horn (Pl. III, figs. 7 and 8.), where the base of the deflexed epistomal lobe forms an angle with the frons, the ridge so formed being continuous with the sides or lateral lobes of Horn, the latter being not in the least prominent.

Structural and Sculptural Characters in the Genus Stibia

The form is elongate, slightly robust and ovate to subfusiform; in cross section at middle of the elytra the body is shown to be more or less transversely oval (Pl. IV, fig. 13.). Size variable, ranging from 6 mm. to a little more than 12 mm. in length; smallest in *puncticollis* Horn, largest and stoutest in *imperialis, tanneri* and *tortugensis* here described, in the order named.

The luster is opaque in *granulata* Blais. and *cribrata* Blais., dull and alutaceous in *tortugensis* and more or less polished and shining in the other species, but sometimes varied with some degree of dullness. Usually the luster is distinctly alutaceous on the apical declivity of the elytra. The pubescence is very inconspicuous, setiform within the punctures or a little longer and recumbent as on the abdomen; short and distinct on the labrum, palpi, antennae and legs. At times some individual variation is observed.

The head is more or less transverse before the post-temporal line of nuchal constriction, widest across the eyes or equally so with the sides of the frons. The eyes are transverse, irregularly oval (Pl. V, fig. 13.) to ovate (Pl. V, fig. 12.) and more or less emarginate anteriorly, occasionally broadly and feebly so posteriorly due to the impinging tempora; facets of moderate size, more or less convex and sometimes short setae arise from the surface between them (Pl. III, fig. 8.). The frontal suture is always obliterated and the oblique are but feeble cicatrices.

The antennae are long and slender, extending beyond the pronotal base (Pl. V, figs. 8, 9, 10 and 11.), or moderate in length attaining the pronotal base (Pl. V, figs. 23 and 25.), shorter and not quite attaining the pronotal base (Pl. V, figs. 24 and 26.). Terminal segment of the maxillary palpi is distinctly longer than wide (Pl. III, fig. 10.) or shorter and triangular (Pl. IV, fig. 2.).

Labial palpi small, invisible when the ligula is retracted; terminal segment triangular, feebly inflated and constricted at base. Mentum transverse (Pl. III, fig. 10.), hexagonal, closing the buccal fissures; angulate laterally at apex of the buccal processes, thence convergent to the broadly emarginate apex, the latter equal to about one-third of the width of the base; surface scarcely convex, coarsely and loosely punctate, the peripheral punctures with long bristling hairs.

Mandibles stout, not prominent, each with a dorsal porrect tooth (Pl. V, figs. 20A and B.); right tooth prominent apically, the left short or truncate. Apical to the porrect teeth the mandibles (Pl. III, fig. 9.) are glabrous, thence dorsally and externally, strongly and densely punctate to the base; external surface of each broadly impressed in about basal one-half (scrobe), giving protection to the appressed maxillary palpi when in repose, beneath the projecting sides of the frons and before the antennal insertions. Apex of each mandible is bifid, the upper division or cusp is large, chisel-like and concave within; the lower cusp is tooth-like, subacute and about one-third as large as the superior cusp. In full adduction the mandibles grasp the sides of the epistomal lobe, their apices over-lapping and the porrect teeth come into contact at the apex of the epistomal lobe, completely sealing the oral orifice with the labrum in full retraction. In partial adduction of the mandibles the sides of the extended labrum are received in the emarginations beneath the porrect teeth (Pl. V, fig. 19J.). When fully protruded the labrum is more or less quadrate, sides parallel, rounding into the apex which is rendered somewhat feebly bilobed by the shallow emargination and the upper surface has a median linear impression (Pl. IV, fig. 2.). The gula is transversely constricted behind the submentum and buccal processes, rendering them prominent ventrally.

The prosternal process is arcuate between the coxae and does not project beyond the same. The sternal punctures are large, round, varying more or less in size and depth, as well as being irregularly spaced. Propleurae more or less glabrous and finely punctate; hypoleural punctures large and shallow, discrete or at times slightly coalescent with margins entire or slightly open anteriorly and feebly sublunate; the coxal convexities may be punctate or impunctate or rugose. The parapleurae are likewise very coarsely and more or less irregularly punctate; the mesepisterna usually have about twelve punctures each and the metepisternal punctures vary in number, are irregular in a single or double series. The epimera are impunctate, although at times three or four punctules are more or less visible on the mesepimera. A few scattered and rather long setae may be present, especially about the coxae.

Elytra oval to slightly fusiform, moderately elongate and more or less convex (Pl. IV, fig. 13.), never strongly inflated; somewhat declivous antero-laterally at base, permitting the lateral third of the pronotal base to overlap the humeri, the latter obtuse, never prominent. Elytral base feebly emarginate in middle third, never wider than the pronotal base, always margined, margin never coarse and irregular on its posterior edge; scutellum small, in line with the basal margin, never entering to any extent between the elytra. Sides of the elytra moderately inflexed, apical declivity never abrupt, always more or less arcuately oblique; apex more or less narrowly obtuse and subogival, rendered somewhat prominent by the submarginal impression, never distinctly lobed, although at times the elytral margins may be slightly and broadly sinuate in apical fifth, so that when viewed from above a lobe may appear to be present; usually feebly emarginate at the suture. Disk with nine series of punctures and one against the margin, as well as short scutellar rows of three or four punctures; punctures of the series vary somewhat in coarseness in the species, strong and distinct on the apical declivity in part of the species, smaller in some and quite obsolete in others; intervals distinctly to obsoletely punctulate.

Epipleurae narrow, very gradually narrowing to apex, the latter emarginate, in distal fourth the inferior margin forms a flange to interlock with the lateral margins of the last three abdominal segments.

Abdomen never strongly convex, coarsely and rather cribrately punctate in the species of Groups A and B; finely and very sparsely so throughout the central area in Groups C and D, although at times the punctation stronger; usually the punctures are larger on the first segment, denser and somewhat intermediate in size on the fourth and fifth segments. The pubescence consists of short recumbent hairs, that vary in length in the different species; a few scattered, erect and rather long setae are observed especially in *blairi* here described, and in some specimens appear to be symmetrically placed, suggesting the possibility of being ambulatorial in character, these hairs are evidently easily lost. The edges of the last three abdominal segments are narrowly expanded and modified to clasp the flange on the inferior margin of the epipleurae, as in *Auchmobius*.[7]

The legs are of moderate length, somewhat shorter and noticeably stouter in the species of Groups A and B; distinctly slender and longer in most of the species of Groups C and D. The femora are densely punctate and the tibiae densely muricate and more or less spiculate externally. In each species the profemora and tibiae are a little stouter than the others; the mesofemora and metafemora are rather slender and subparallel, occasionally slightly and gradually thickened apically or stouter in apical one-half. Usually the metatibiae are as long as the femur. Direct comparison shows that on the average that the profemora are about three-elevenths of their length shorter than a mesofemur, and a mesofemur is about one-twelfth of their length shorter than a metafemur. The tibial ratios are quite similar. The tarsi vary more or less in the species as regards length and slenderness. The metatarsi on the average are about two-thirds as long as their tibiae; the other tarsi bear a similar relation to their tibiae. The tarsi are pubescent above and spinous beneath.

STIBIA Horn

1870. *Stibia* Horn, Trans. Amer. Philo. Soc., XIV, p. 260. (Revis. Tenebr.)

1874. *Stibia* Horn, Trans. Amer. Ent. Soc., v, p. 30.

1883. *Stibia* Horn and LeConte, Smiths. Misc. Coll., 507, p. 362. (Class. Coleop. Amer. N. Mex.)

1907. *Stibia* Casey, Proc. Wash. Acad. Sci., IX, p. 448.

1924. *Eutriorophus* Casey, Mem. on the Coleop., XI, p. 296.

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[7] Trans. Amer. Ent. Soc., LX, p. 231, pl. 17, fig. 27, Sept. 14, 1934.

Dr. Horn's characterization of the genus *Stibia* may be repeated as follows:

Front trilobed, middle lobe triangular, slightly deflexed, lateral lobes broadly rounded. Tarsi pubescent and spinous beneath. Eyes rounded and feebly emarginate, with a distinct superciliary ridge. Mandibles without tooth on upper surface.

He states that the deflexion of the middle lobe, forms an angle with the rest of the front, so that when the front is viewed from above it appears broadly rounded.

Dr. Horn's definition is to be modified as follows:

Sides of the frons before the eyes more or less rounded, epistomal lobe triangular and more or less deflexed, its base or angle of deflexion forming the epistomal ridge which is continuous with the sides, so that when the latter is viewed from above it appears broadly rounded. Eyes more or less oval to ovate and more or less feebly emarginate anteriorly, bounded above by a more or less distinct superciliary carina. Mandibles each with a porrect tooth.

GENOTYPE: *Stibia puncticollis* Horn. Type locality: Peninsula of Baja California. Collected by Mr. Wm. M. Gabb.

Dr. Horn compared the genus *Stibia* with *Triorophus* and gave the following differential synoptic statements: [8]

Middle lobe of epistoma narrowed at base and clasped by a tooth-like process from the base of the mandible. (*vide* Pl. III, fig. 5A.) *Triorophus* LeConte
Middle lobe of epistoma triangular, rapidly narrowed in front, mandibles without basal tooth. (*vide* Pl. III, fig. 8.) .... *Stibia* Horn

In the Classification of the Coleoptera of North America,[9] Drs. Horn and Leconte arranged the genera as follows:

Mandibles usually toothed above, clasping the lobe of the epistoma, not concealed, labrum concealed or feebly prominent. Group Triorophi
  Intercoxal process of abdomen broad, feebly narrowed in front, tip subtruncate or rounded;
    Tarsi spinous beneath; hind tarsi with joint 1 equal to 3 and 4 together;
      Middle lobe of front narrowed at base and clasped by a tooth-like process from the base of the mandible. ...... *Triorophus* LeConte
      Middle lobe of front triangular, much narrowed in front, mandibles without basal tooth. .... *Stibia* Horn

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[8] Trans. Amer. Ent. Soc., v, p. 30, (1874).

[9] Smiths. Misc. Coll., 507, p. 362, (1883).

The above synoptic statements are not explicit and leave a doubt regarding the character of the mandibular teeth referred to. The only reference which can be construed as meaning the porrect teeth, is that the "mandibles usually toothed above" and that the basal tooth is absent in *Stibia.* The porrect teeth are such important structural entities and so evident on careful examination, that it is quite amazing that they should be passed over so lightly. It is very easy to overlook them, as they are not easily seen when in full adduction against the sides of the epistomal lobe, or buried in regurgitated or other matter.

Generic genital characters

As the greater number of species of the Tenebrionidae have the middle lobe of the aedeagus in the inferior position when in the state of rest, it will be considered as the normal position and the edeagophore will be described as always in that relation to simplify description.

Male. Aedeagus (Pl. V, figs. 1, 2 and 3.): See tribal characters. Edeagophore small and slender, the apicale elongate, two and one-half times as long as wide, moderately arched, dorsal plate transversely convex, a lozenge-shaped membranous area at junction of basal and middle thirds; sides arcuate and moderately convergent in apical two-thirds, broadly sinuate in basal third; apex slightly emarginate, surface with few and moderately short bristling setae; base subtriangular. Sides of dorsal plate inflexed in basal one-half, uniting on the median line to form a suture; genital fossa widely open and the middle lobe widely exposed in apical two-thirds. Lobe briefly membranous and slightly emarginate at apex, expose surface with a median linear sulcus. Basale distinctly, shorter than the apicale, partly obscured by membrane, not arched, lateral sclerites separated by membrane dorsally.

Female. Aedeaga: (Pl. V, figs. 4, 5 and 6.) See tribal characters. Genital segment quadrate to triangular according to the degree of adduction of the valves. Dorsal plate of each valve narrowed apically, not margined and arcuately continuous with the ventral sclerites, apex narrowly and obtusely rounded; appendage absent, fossa lateral and subapical in position, shallow and giving origin to a tuft of diverging hairs. Apical sclerite of ventral plate three times as long as the basal, triangular as viewed from beneath, convex from side to side; internal margins divergent from base to apex and sinuate in apical fourth; basal sclerite short and transverse. Surfaces sparsely and finely punctate, the punctures more or sunken in oval impressions which seem to vary according to the angle of vision; pudendal membrane rather widely exposed, smooth, apparently slightly chitinized toward base and with a median raised linear fold. Basale (valvifer of Tanner) elongate, one and one-half times as long as the valves, lateral sclerites separated by membrane on the median line; surfaces minutely and sparsely punctate, pubescence consisting of short and semirecumbent hairs; in relation with the rectal canal dorsally.

The species of *Stibia* are divisible into four Groups and the synoptic alphabetical sequence, A, B, C and D, indicates their relationships, as follows:

Synopsis of the Groups

Males without a pubescent fovea on first abdominal segment.............1
Males with a pubescent fovea on first segment (Pl. V, figs. 29 and 30.). Pronotal apex truncato-emarginate, apical angles more or less prominent; lateral margins more or less thickened and obtusely rounded in posterior two thirds (Pl. III, figs. 12 and 13.). Elytral series of punctures distinct to obsolescent on apical declivity. ....Group D (p. 79)

1. Pronotal apex truncato-emarginate, apical angles small and never more than feebly prominent. 2
Pronotal apex deeply and evenly emarginate between the large, acute and anteriorly prominent angles (Pl. IV, fig. 10). Elytral series very feebly marked. ....(Group A (p. 67)

2. Lateral pronotal margins bead-like and linear throughout and more or less narrowly reflexed (Pl. III, figs. 14 and 15.). Elytral series strong and entire. ....Group B (p. 69)
Pronotal lateral margins somewhat thickened in posterior two-thirds and not beaded. Elytral series more or less obsolescent on apical declivity. ....Group C (p. 76)

Group A

Stibia granulata Blaisdell

1923. *Stibia granulata* Blaisdell, Proc. Calif. Acad. Sci. (4), XII, p. 238, July 10.

A very distinct species, easily recognized by the opaque teguments, densely and microscopically granulate surface; distinctly emarginate pronotal apex, large, acute and anteriorly prominent angles. In both *cribrata* Blais. and *fallaciosa* the elytral series of punctures are distinct and the surface more or less alutaceous.

Form ovate, about two and two-sevenths times as long as wide, widest across middle of elytra. Color black, legs dark rufo-piceous; antennae, palpi, labrum and tarsi rufous. Surface opaque and microscopically granulate.

Head about twice as wide as long (Pl. IV, fig. 2.). Eyes and sides of frons equally prominent. Sides broadly and not strongly arcuate, moderately convergent to the rounded angles, thence nearly straight inwardly to the cicatrices of the oblique sutures; epistomal lobe triangular, sides nearly straight to narrowly rounded apex, surface scarcely convex. Frons slightly convex, broadly and rather strongly impressed anteriorly, most so on the position of the frontal suture, defining the rather wide and moderately convex epistomal ridge, which is continuous with the supra-antennal convexities, the latter not more prominently convex and moderately declivous against the eyes, the latter noticeably sunken below the surface plane of the frons; surface rather evenly and densely punctate, punctures not large, discrete and not sharply defined, smaller and slightly less distinct at the periphery, separated by a distance equal to one, two or three times their diameters. Antennae slender (Pl. V, fig. 23.), moderate in length, extending to the pronotal base, outer three segments noticeably widened, the eighth less so; segments three to seven inclusive distinctly elongate and cylindrico-obconical and equal in width; second obconical and one-half longer than wide; third longest, four times as long as wide and twice as long as the second; fourth three times as long as wide; segments five, six and seven equal in length, each two and one-half times as long as wide, eighth obconico-triangular and about one-half longer than wide; ninth and tenth subtriangular and as long as wide, about twice as wide as the third; eleventh suboval and one-half longer than wide.

Pronotum one-half wider than long (Pl. IV, fig. 10.), base and apex equal in width, the latter broadly and moderately deeply emarginate between the rather large, acute and anteriorly prominent angles, margin not beaded, except laterally near the angles, about one-seventh wider than the head; sides differing somewhat in the sexes, evenly and moderately arcuate from angle to angle, although more or less slightly sinuate in vicinity of the angles, margin not distinctly beaded, sharp and linear in anterior one-third, thence slightly thicker and narrowly obtuse to the base; the latter broadly arcuate in middle two-fourths and more prominent posteriorly than the angles, broadly sinuate laterally, angles obtuse and distinct, marginal bead rather wide, flattened and slightly declivous, not very sharply defined centrally, but somewhat abruptly raised laterally. Disk moderately strongly and rather evenly convex, declivous toward the angles; submarginal area in posterior two-thirds somewhat but not broadly impressed, causing the margin to be rather prominent and slightly reflexed; surface densely punctate, punctures discrete, moderately small, not sharply defined and separated by a distance equal to one-half to that of their diameters.

Propleurae indistinctly granulato-punctate, punctures small. Hypopleural punctures moderate in size, discrete and more or less well defined, inferiorly in rows between longitudinal linear rugae; coxal convexities similarly sculptured. Prosternal punctures discrete and well defined; intercoxal process narrow and arcuate, becoming vertically truncate with the angle submucronate.

Elytral oval, about one and one-third times as long as wide, widest at middle, about two and one-half times as long as the pronotum; basal margin feeble, strongest laterally and irregularly sublinear; scutellum short and transverse, in line with the bead; humeri obtusely rounded; sides broadly and moderately arcuate, converging in apical one-fourth to the rather narrowly rounded and subogival apex, the latter not lobed, submarginal impression scarcely discernible. Disk quite strongly and evenly convex, arcuately declivous laterally and moderately inflexed, obliquely and arcuately declivous apically; strial punctures small and more or less faintly defined, may not be discernible, or for the most part irregular and obscured by the surface sculpturing; intervals flat in the central area, becoming gradually convex laterally, on the apical declivity they appear more or less costate when viewed from behind.

Mesosternum, metasternum and episterna coarsely and somewhat perforately punctate, punctures discrete. Mesosternal epimera impunctate. Metasternal episterna irregularly punctate. Punctation more or less obscured by the granular sculpturing.

Abdomen moderately convex, finely punctate, punctures separated by a distance equal to four or five times their diameters, coarser and stronger about the coxae, denser on fifth segment. Each puncture with a short, appressed setiform hair; other and longer, erect and widely scattered hairs are present. First segment on the median line a little longer than the second, behind the coxae equal in length to the third; second twice as long as the fourth, third as long as the fifth. Legs rather short and somewhat stout. Metatarsi three-fifths as long as their tibiae; first segment almost as long as the second, third and fourth together; second and third together equal in length to the fourth, third small and about one-half the length of second.

Male. Somewhat narrower, elytra rather less inflated; sides of the pronotal disk less irregularly, more evenly arcuate (Pl. IV, fig. 10) from apex to base. Abdomen without pubescent fovea.

Female. Rather more strongly ovate, elytra somewhat inflated; sides of pronotal disk rather irregular, due to slight and uneven impression of the submarginal area, margin may be slightly undulate.

Measurements.—(Type) Length, 8.5 mm.; width, 3.7 mm.

Distribution.—Santa Catalina Island, Gulf of California, June 12, 1921, (E. P. Van Duzee and J. C. Chamberlin), [*holotype*, female, no. 1144; 1 male, 1 female *Paratypes*, Cal. Acad. Sci.].

Synopsis of Group B

Elytral striae impressed, punctures coarse; discal intervals convex, becoming costate laterally and apically.

Frontal and pronotal punctures very dense, in rows of two to five and more or less confluent, intervals very convex and linear. Surface opaque .... *cribrata* Blaisdell

Elytral striae not impressed; discal intervals flat, becoming more or less subcostate laterally and apically.

Frontal and pronotal punctures less dense, discrete, scarcely in rows. Surface somewhat shining and alutaceous. (*Stibia puncticollis* Blaisdell nec Horn.)............................*fallaciosa* new species

Head and pronotum more densely punctate, punctures discrete, centrally in rows of two to four between very convex and linear intervals; laterally punctures single, the intervals more or less reticulate and similarly linear and prominent. ....*interstitialis* new variety

Stibia fallaciosa new species

1925. *Stibia puncticollis* Blaisdell nec Horn, Proc. Calif. Acad. Sci., (4th S.), xiv, p. 329, Sept. 5.

Fallaciosa is very distinct from *granulata* Blais., but has to be particularly differentiated from *cribrata* Blais. In the latter species the form is more ovate, luster dull and more alutaceous, sides of the pronotum less arcuate with the margins more undulating anteriorly; the elytral striae are more impressed and the intervals more convex and costate laterally and apically, with the punctation cribrate throughout.

In *fallaciosa* the luster is more shining and less alutaceous, the punctation strong throughout but not cribrate; elytral striae not impressed, intervals not convex on the central area of the disk, but gradually become so laterally and apically where they are more or less subcostate. In both species the first two parasutural striae of each elytron are strong and parallel on the apical declivity.

Form ovate, widest at middle of elytra or slightly behind the same, about two and one-fifth times as long as wide. Color piceous to black; antennae, palpi and legs more or less dark rufous. Luster more or less shining and finely alutaceous. Elytral series of punctures entire and not impressed.

Head distinctly less than twice as wide as long (Pl. IV, fig. 19.), eyes not more prominent than the sides of the frons, the latter slightly convergent and feebly arcuate to the broadly rounded angles, thence transverse to the cicatrices of the oblique sutures; epistomal lobe moderate, triangular, obtusely rounded at apex, margin serrulate, arcuately deflexed. Frons less than moderately convex, broadly impressed on the position of the obsolete frontal suture, impression strongest laterally within the sides and rather well marked, moderately reflexed supraciliary carinae; supra-antennal convexities strongly convex antero-posteriorly and notably declivous against the eyes; epistomal ridge obtusely convex and not abruptly formed; punctation moderately coarse and irregular, punctures discrete, separated by a distance equal to one-half to almost twice their diameters, more widely spaced on the vertex, smaller laterally and on the epistomal ridge and lobe, intervals nearly flat. Eyes rather large and ovate, moderately emarginate anteriorly and sunk well below the frontal plane. Antennae somewhat short, slender (Pl. V, fig. 24.), not quite attaining the pronotal base; segments less elongate than in *cribrata* Blais., two to five inclusive equal in width, second shorter than the fourth and slightly longer than the fifth; third and fourth elongate, third two and one-half times as long as wide and about one-fifth longer than the fourth, the latter twice as long as wide; segments five to eight inclusive, less than twice as long as wide, a little stouter and obconical; eighth, ninth and tenth increasing slightly in width, ninth and tenth triangular and as long as wide, eleventh oval, a little longer than wide and not as wide as tenth.

Pronotum about one-half wider than long (Pl. IV, fig. 7.), apex truncato-emarginate, feebly beaded laterally, angles subacute, slightly prominent and feebly everted; sides broadly arcuate, more or less noticeably emarginate behind the apical and rather feebly sinuate before the basal angles, margin may be more or less slightly undulate before the middle, sharp and feebly reflexed (Pl. III, fig. 14.), increasing a little in coarseness from apex to base; the latter slightly wider than apex and broadly arcuate in middle three-fifths, thence sinuate to the subrectangular angles which may be made slightly prominent by the basal bead; marginal bead coarse, flat and arising abruptly from the discal surface laterally. Disk strongly convex and declivous toward the angles, more or less narrowly and somewhat irregularly impressed in the submarginal area; densely punctate, punctures as on the head, discrete, strong and less closely placed centrally, separated by a distance equal to one-half to about three times their diameters, smaller and denser in the submarginal impressed area, scarcely at all confluent.

Propleurae densely punctate, punctures small becoming coarser anteriorly, marginal bead not noticeable from the side. Hypopleural punctures large, rather deep and close, in irregular rows and not distinctly confluent, their lateral margins somewhat lunate, intervals not strongly convex; coxal convexities more or less similarly and sparsely punctate. Prosternal punctures similar and discrete; process arcuate between the coxae.

Elytra oval, widest at middle, rather less than one-half longer than wide, two and one-half times as long as the pronotum; base feebly emarginate, marginal bead irregular, scutellum small and in line with the bead, rarely slightly prominent; humeri obtuse beneath the pronotal basal angles; sides broadly and evenly arcuate, more convergent in apical fourth to the obtusely rounded apex, the latter slightly emarginate at the suture. Disk strongly convex, at times somewhat less so in the central area, strongly arcuate and declivous laterally, moderately inflexed; apical declivity arcuate and somewhat oblique, submarginal impressed area narrow laterally, wider across the suture, sometimes poorly defined, viewed vertically from above the apex appears somewhat lobed; punctures of the strial series moderately large and strong throughout, series regular, punctures separated by a distance equal, more or less to twice their diameters, each slightly impressed; first two parasutural striae of each elytron parallel on the apical declivity to the submarginal area; intervals flat in the central area, becoming gradually more or less convex laterally and almost costate on the apical declivity, extremely finely, very sparsely and more or less obsoletely punctulate. Scutellar series of punctures more or less irregular.

Mesosternal and metasternal punctures moderately large, round and discrete, moderate in depth; parasternal punctures smaller, those of the metepisterna forming a single entire series, epimera impunctate as usual.

Abdomen moderately convex, rather coarsely and sparsely punctate, punctures distinctly defined, somewhat larger on first segment, smaller on sides of the third and fourth, denser on the fifth. First segment on median line twice as long as the fifth, behind the coxae as long as third; second as long as the fourth and fifth together, third twice as long as the fourth. Legs moderate in stoutness and length. Metafemora about one-fourth longer than their tibiae. Metatarsi moderately slender and two-thirds as long as their tibiae; first and fourth segments quite equal in length and two and one-half times as long as the second, the latter one-half longer than the third.

Male. Usually smaller, but variable as regards size. First abdominal segment without pubescent fovea; apex of last tergite broadly arcuate.

Female. Larger, elytra more or less inflated. Apex of last abdominal tergite broadly and rather deeply sinuate, with a short process arising from the middle of the sinus, that is subtriangular, as long as width of base and rounded at apex; lateral lobes subangulate (Pl. V, fig. 14.).

Measurements.—(Types) Length 8 to 9 mm.; width 3.5 to 4 mm.

Holotype.—Female; Monserrate Island (Las Galeras, West Island), Gulf of California, June 13, 1921. (J. C. Chamberlin). [Cal. Acad. Sci., no. 3946].

Allotype.—Male; with same data, [no. 3947].

Paratypes.—3 males, 6 females; six from type locality, one from San Carlos Bay, Lower California, July 8, 1921, (E. P. Van Duzee).

Distribution (Seventeen specimens studied.) — Besides the above type region, the species occurs on Ceralbo Island, Gulf of California, collected on June 7, 1921, by E. P. Van Duzee. It occurs on the main land of Lower California at Loreto, taken May 20, 1921, and at San Carlos Bay, July 8, 1921, by Mr. Van Duzee.

Certain specimens taken on the main land of Lower California, and more or less associated with the typical form, show a distinct divergence. These are to be considered as a variety, which is defined as follows:

Stibia fallaciosa interstitialis new variety

Form more ovate, color piceous to black.

Head and prothorax more or less relatively and comparatively smaller. Antennae slender and with the intermediate segments more elongate. Frontal impression stronger anteriorly and the epistomal ridge more prominent.

In the central area of the frons anteriorly behind the epistomal ridge, the punctures are in rows between very convex, linear, prominent and more or less longitudinal intervals, or the intervals may be reticulate throughout, enclosing single punctures in the meshes.

Measurements.—(Type) Length 8 mm.; width 3.5 mm.

Holotype.—Female; Arroyo Gua, Loreto, Lower California, Mexico, May 20, 1921. (J. C. Chamberlin). [Cal. Acad. Si., no. 3953].

Paratypes.—10 females; nine with some data; one taken on Ceralbo Island, Gulf of California, June 7, 1921, (E. P. Van Duzee), [Cal. Acad. Sci.]

Two paratypes placed in the collection of the American Entomological Society.

Eighteen specimens studied.

The smallest specimen has been selected as the type, because it shows the greatest degree of divergence from the typical form. The specimens vary in size, one of the larger measures 9.5 mm. in length and 4 mm. in width. In typical *fallaciosa* the head and prothorax are larger in comparison to the body than in specimens of *interstitialis;* the frontal punctures are discrete, less dense, with the intervals quite flat and the frontal impression feeble at the middle of the epistomal ridge.

Genital characters. — Male. Edeagophore relatively small, slender and elongate. Apicale about three times as long as wide and feebly arched; sides broadly and evenly arcuate from base to apex, convex from side to side dorsally and rather abruptly declivous at the extreme apex, declivity with a number of rather long bristling setae; inflexed sides beginning at the extreme apex, very gradually increases in width to become contiguous on the median line at middle of the length, genital fissure broadly fusiform, fossa narrower than in *williamsi* Blais. and the middle lobe less exposed and not prominent; dorsal surface without a membranous area. Basale or valvifer obscured by membranes in the specimen studied.

Female. Genital segment as in *williamsi.* Pubescence sparse, longer and more flying; apices of the valves broader; surface pitted with small oval impressions from which the hairs arise.

In the male of *williamsi* the apicale is shorter and more strongly arched (Pl. V, fig. 3 G,); apex not abruptly declivous, dorsal surface more convex from side to side and a median membranous area is present; the sides are more or less constricted in basal third.

Stibia cribrata Blaisdell

1923. *Stibia cribrata* Blaisdell, Proc. Calif. Acad. Sci., (4), xii, p. 239, July 10.

1925. *Stibia opaca* nomen nudum, Proc. Calif. Acad. Sci., (4), xiv, p. 329, Sept. 5.

Cribrata Blais. is easily recognized by the dull luster, impressed striae of punctures and more or less strongly costate intervals of the elytra, rather sharp lateral pronotal margins (Pl. III, fig. 15.) which are reflexed and somewhat different in the sexes; the two parasutural series of punctures of each elytron are parallel and entire to the submarginal impression at apex, as in *fallaciosa* n. sp. *Granulata* Blais. is opaque and the surface of the body microscopically granulate, elytral punctures small, series feebly evident, shallow and nearly effaced by the surface granulation, besides the anterior pronotal angles are large, acute and anteriorly prominent.

Form ovate, elongate, a little more than twice as long as wide, elytra at times more or less inflated; punctation strong throughout. Color more or less opaque black; antennae, palpi and legs more or less dark rufous. Surface finely alutaceous.

Head about twice as wide as long (Pl. III, fig. 7.), slightly widest across the eyes; sides evenly arcuate and slightly convergent to the more strongly rounded angles, thence transversely and slightly sinuate past the cicatrices of the oblique sutures to the sides of epistomal lobe; the latter moderately and somewhat arcuately deflexed, triangular and obtusely rounded at apex; epistomal ridge rather prominent and obtusely convex. Frons slightly convex, broadly and rather strongly impressed behind the ridge, notably so within the supra-antennal convexities, which are prominent and arcuately declivous against the eyes, the latter sunken below the surface plane; supraciliary carinae rather well marked, arising abruptly from the ocular margins and passing forward to the ridge; surface densely and coarsely punctate, punctures strong, discrete and rather irregular in outline from mutual contact, in somewhat posteriorly diverging rows, between convex linear or reticulate intervals, smaller laterally as well as on the epistomal ridge and lobe with intervals less convex. Eyes feebly convex and not in the least prominent. Antennae moderate in stoutness and length (Pl. V, fig. 25.), extending to the pronotal base. Segments three to six inclusive elongate and cylindrico-obconical, second one-half longer than wide and quite equal in length to the eighth; third four times as long as wide and as long as the seventh and eighth together, and also about two-fifths longer than the second; fourth segment three times as long as wide, fifth and sixth equal in length and twice as long as wide; seventh and eighth subequal in length and about one-half longer than wide; ninth and tenth subtriangular, ninth as long as wide, tenth wider than ninth and a little wider than long, eleventh suboval and one-half longer than wide.

Pronotum about two-fifths wider than long, (Pl. IV, fig. 8.), base and apex about equal in width, the latter subemarginate in moderate circular arc, slightly beaded laterally within the angles, which are subacute and slightly prominent laterally; sides somewhat different in the sexes, moderately broadly arcuate to almost biarcuate, more or less feebly sinuate behind the apical and slightly and more broadly so before the basal angles, variably so at middle, margin rather sharp and feebly reflexed especially posteriorly, somewhat beaded (Pl. III, fig. 15.). Base broadly and moderately arcuate in middle two-fourths, thence broadly sinuate to the angles; the latter rather acute, slightly prominent due to the lateral and basal sinuations; bead coarse, rather abruptly formed, flat and slightly declivous posteriorly. Disk moderately convex, rather declivous toward the angles, more or less irregularly impressed within the lateral margins (vide infra); coarsely, densely and quite evenly punctate, punctures rather deep between the very narrowly linear and rather prominent reticular intervals, in size similar to those of the frons, somewhat smaller and less well defined laterally in the impressed areas.

Propleural punctures less coarse than those of the hypopleurae, which are large, round and moderately shallow, coxal convexities similarly punctate. Prosternal punctures similar but somewhat deeper, process arcuate between the coxae and not prominent posteriorly.

Elytra oval, widest at middle, about one-half more or less longer than wide, not quite three times as long as the pronotum; base adapted to that of the pronotum, marginal bead irregular and somewhat coarse; scutellum small, not well defined and in line with the bead; humeri obtuse, sometimes rendered slightly dentiform by the basal margin; sides broadly and rather strongly arcuate to the very obtusely ogival apex, the latter not lobed. Disk moderately convex in the central area, more strongly so and arcuately declivous laterally, degree of inflexion depending on the amount of inflation, apical declivity arcuate and oblique; strial series entire, punctures sharply defined as on the pronotum, round and somewhat impressed, separated by a distance equal to one or two times their diameters; first two parasutural series parallel and distinct on each elytron to the narrow and irregularly defined apical submarginal impression, the latter interrupted at the suture; sutural intervals flat, thence gradually convex to become distinctly costate laterally and on apical declivity, very sparsely, finely and more or less obsoletely punctulate. Scutellar series of punctures more or less irregular and varying in size.

Mesosternal, metasternal and parasternal punctures large, round, subperforate and irregularly spaced. Mesosternal epimera with an obscure row of punctules. Metepisternum with a series of three to five punctures. Abdomen moderately convex, strongly punctate, punctures slightly smaller than those of the elytral series, separated by a distance equal to one to three times their diameters, largest on base of first segment, denser on the fifth. First segment on the median line as long as third and fourth together, second one-third longer than the third, the latter twice as long as the fourth and equal in length to the fifth. Legs moderately short and comparatively stout. Metafemora about one-fifth longer than their tibiae. Metatarsi slender, about two-thirds as long as their tibiae; first segment quite as long as the fourth, second slightly longer than the third, the latter about one-third as long as the first.

Male. Generally smaller or less broad. Pronotal lateral margin more or less sinuate just before the middle (Pl. IV, fig. 8.), the submarginal impressed area wider and more widely impressed opposite to the marginal sinuation, the discal surface rising rather abruptly from the impressions. First abdominal segment without a pubescent fovea.

Female. Larger, elytra may be somewhat inflated. Lateral pronotal margins moderately broadly arcuate, not usually sinuate or slightly so before the middle; submarginal impression narrow and less irregular.

Measurements.—(Types) Length 7 to 7.5 mm.; width 3 to 3.5 mm.

Distribution (Seventeen specimens studied).—Ildefonso Island, Gulf of California, May 17, 1921, (J. C. Chamberlin), [*holotype*, female, no. 1145; *allotype*, male, no. 1146; 10 *paratypes;* Cal. Acad. Sci.]. Porto Escondido, Lower California, Mar. 8, 1928, (Thos. Craig.). Sexes not positively identifiable.

Two paratypes placed in the collection of the American Entomological Society.

Group C

Stibia williamsi Blaisdell

1925. *Stibia williamsi* Blaisdell, Proc. Calif. Acad. Sci., XIV, (4), p. 328, Sept 5.

In *williamsi* Blais. the elytra are rather more noticeably inflated than in the species of Group D, except *sparsa* which it resembles superficially, the body surface is shining and the head and pronotum more or less dull in luster; the punctation of the head and pronotum is variable—irregularly spaced and more or less discrete to denser, with the punctures arranged in rows between convex and more or less linear intervals; the pronotal angles are small and not at all prominent, with the lateral margins evenly arcuate, thin and narrowly obtuse with the submarginal areas narrowly impressed in middle two-fourths and at times more broadly so at middle, involving the disk to a slight extent; the punctures on the apical declivity of elytra while diminishing in size are more distinctly defined than in *sparsa*. In the remarks under the original description,[10] *Stibia opaca* is mentioned, this is a *lapsus calami* and therefore a *nomen nudum* and should read *Stibia cribrata*.

In *sparsa Blais.* the punctation of the head and pronotum is very discrete, the punctures are smaller on the pronotum than on the head and more widely spaced; the lateral pronotal margins differ more or less in the sexes, in the female the sides are evenly arcuate, while in the male the margins are more or less noticeably sinuate before the middle and, the submarginal areas are more widely and irregularly impressed; a pubescent fovea is present on the first abdominal segment. The Group characters are differential.

Form subfusiform-ovate, about twice as long as wide, strongly convex, elytra more or less inflated. Color nigro-piceous, antennae and legs more or less rufo-piceous, palpi rufous. Surface glabrous and shining.

Head about twice as wide as long, slightly widest across the eyes (Pl. IV, fig. 20.); sides arcuately converging to the cicatrices of the oblique sutures and there more or less feebly sinuate; deflexed epistomal lobe triangular, not noticeably transverse, sides slightly arcuate to straight and serrulate, apex obtuse, surface evenly convex, angle of deflection or epistomal ridge not very well marked and continuous with the sides of the frons. Frons slightly convex, not strongly but broadly impressed behind the base of the lobe, impression strongest laterally within the supra-antennal convexities, the latter moderately convex and gradually declivous against the eyes; supraciliary carinae feebly marked and bounding the preocular declivity within; surface coarsely punctate, punctures rather closely placed to more widely spaced, intervals at times linear to flat, occasionally in slightly diverging rows of three to five with some coalescence; punctures smaller, closer and discrete laterally as well as on the epistomal ridge and lobe. Eyes subovate, slightly more prominent than sides of the frons; facets moderate in size and slightly convex. Antennae long and slender, (Pl. V, fig. 7.), extending about five segments beyond the pronotal base, distal three segments slightly larger; segments two to eight inclusive elongate, cylindrico-obconical, the second not quite twice as long as wide, equal in length with the fifth, sixth or eighth; segments eight to eleven inclusive subequal in length; third longest, three times as long as wide and as long as the seventh and eighth together; fourth a little longer than fifth, ninth a little longer than wide and wider than the eighth, tenth larger and as long as wide, eleventh oval and one-fourth longer than wide.

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[10] Proc. Calif. Acad. Sci., (4), XIV, p. 329, Sept. 5, 1925.

Pronotum transverse, about one-half wider than long (Pl. IV, fig. 14.), apex truncato-emarginate and about one-fifth wider than the head, not strongly beaded laterally, angles subrectangular and not at all prominent; sides broadly and moderately arcuate, scarcely sinuate anteriorly behind the angles, rather less arcuate and more convergent posteriorly, margin subacute (viewed from above), somewhat thickened and obtuse in posterior two-thirds (viewed obliquely from the side), narrowest and more or less beaded in anterior one-third; base broadly arcuate in middle two-fourths, slightly and broadly sinuate laterally, slightly wider than the apex, angles obtuse and distinct but not prominent, marginal bead flat and moderately wide. Disk rather strongly convex, moderately declivous toward the angles, densely punctate, punctures not very coarse, in part discrete, otherwise tending to form slightly arcuate rows with some coalescence, in the central area separated by a distance equal to their diameters; punctures smaller laterally, also sparser within the apical angles; submarginal impressed area moderately well marked in basal two-thirds.

Propleurae smooth, with few scattered punctules. Hypopleural punctures large and shallow, more or less open anteriorly and slightly lunate, scarcely coalescent; intervals irregularly and slightly convex, not linear; coxal convexities more or less impunctate. Prosternal punctures stronger, discrete and well separated.

Elytra oval, about one-half longer than wide, slightly more than three times as long as the pronotum, more or less inflated, less convex in the central area, evenly arcuate and declivous laterally with moderate inflection, arcuately and rapidly declivous apically; sides broadly, more or less strongly and evenly arcuate (as viewed from above), the true margin straighter and more rapidly convergent in apical fourth to the rather narrow and obtusely rounded apex, the latter feebly emarginate at the suture; apical submarginal area scarcely impressed across the suture, the more or less inflated elytra hiding the margin except for a short distance, the apex appearing as a small lobe (viewed from above). Base feebly emarginate, margin rather wide, not very irregular on its posterior edge; scutellum small, in line with the margin; humeri obtuse not overlapped by the pronotal basal angles. Strial punctures moderate in size, slightly impressed individually, separated by a distance equal to two to four times their diameters, on the apical declivity becoming gradually smaller and partly indistinct, those of the scutellar area small but variable in size and confused; intervals very sparsely and irregularly punctulate.

Mesosternal, metasternal and parapleural punctures moderately large, round and rather deep. On the mesosternum the punctures are denser; on the central area of the metasternum they are more widely spaced, irregular and more or less variable in size. The mesosternal epimera are almost impunctulate, usually with two or three punctules. There is a median longitudinal series of about nine punctures on the metasternal episterna.

Abdomen moderately convex, punctures small, sparser on the second and third segments, largest on first segment in the vicinity of the coxae and intermediate in size and denser on fourth and fifth segments; surface may be more or less longitudinally rugulose. First segment on median line as long as the third and fourth together, behind the coxae as long as the third, the latter equal in length to the fifth and twice as long as the fourth. Legs slender and moderate in length. Metatarsi two-thirds as long as their tibiae; first and fourth segments quite equal in length; first three times as long as third, second about one-fourth longer than the third.

Male. Usually smaller and less inflated than the female; first abdominal segment without pubescent fovea. For genital characters see plate V, figures 1, 2 and 3.

Female. Usually larger and with the elytra more or less moderately inflated. Last abdominal tergite (Pl. IV, fig. 23.) bisinuate and trilobed at apex, middle lobe arcuate and but slightly more prominent than the lateral lobes. For genital characters see plate V, figures 4, 5 and 6.

Measurements.—(Types) Length 8.5 to 9.5 mm.; width 4 to 4.5 mm.

Distribution (125 specimens studied).—Middle San Benito Island, Gulf of California, August 13, 1922, (Hanna & Slevin), [*holotype*, female, no. 1682; *allotype*, male, no. 1683; *paratypes;* Cal. Acad. Sci.]. East and West San Benito Island, Gulf of California, August 12, 13, 1922, [*paratypes;* Cal. Acad. Sci.].

Paratypes have been placed in the collections of the American Entomological Society and that of the Museum of Comparative Zoology.

Synopsis of Group D. Stibia genuina

Elytral strial punctures smaller on the apical declivity and well defined, not at all obsolescent. 1

Elytral strial punctures on apical declivity, gradually and distinctly smaller, obsolete for the most part, few scattered punctules present...3

1. Lateral pronotal margin more or less sinuate slightly before the middle, antennae long and slender. 2

Lateral pronotal margin evenly arcuate, narrowly and obtusely rounded posterior one-half, not glabrous but punctulate; smaller species, frons and pronotal disk densely punctate, punctures large and more or less coalescent, intervals convex, rather prominent and reticulate. (Syn. *Stibia hannai* Blais.). Lower California. ....*puncticollis* Horn

Coarsely and strongly punctate throughout, head and pronotum strongly rugoso-punctate, punctures in longitudinal series and more or less confluent. San Martin Island, Lower California. *martinensis* new subspecies

2. Lateral pronotal margin distinctly thickened and obtuse behind the sinuation, submarginal impressed areas more or less glabrous and convex antero-posteriorly, not impressed anteriorly; frons and pronotum discretely punctate. America Meridionalis...*blairi* new species
3. Form usually larger, stouter, more elongate and subfusiform-ovate. ..4
   Form more ovate, size moderate, resembles *williamsi;* surface polished and shining. Type locality: Santa Inez, Gulf of California. *sparsa* Blaisdell
4. Head and prothorax moderate to relatively and comparatively large in size. 5
   Head and prothorax relatively small; form smaller and less robust; frontal punctures coarse and discrete, smaller on the pronotum; pronotal angles acute, small and slightly everted. Punctures of the elytral series small and not impressed. Abdominal punctures for the most part very small, widely spaced and subobsolete. Surface more or less alutaceous and feebly shining. Type locality: Near Tucson, Arizona. ....*tuckeri* Casey
5. Body surface more or less polished and shining; head and pronotum comparatively moderate in size.................................6
   Body surface dull and alutaceous; head and pronotum relatively and comparatively large; apical pronotal angles small.................8
6. Pronotal apical angles large, everted and reflexed by the apical marginal bead. 7
   Pronotal apical angles small and feebly prominent; frontal and pronotal punctures similar in size, very sparsely and irregularly spaced, discrete throughout; pronotal disk with evidence of an impunctate median line. Type locality: La Puerta, Imperial Valley, California. *imperialis* new species
7. Frontal punctures larger than on the pronotum, irregularly spaced and occurring here and there in rows of three or four, small impunctate areas conspicuous; epistomal ridge usually subacute and with a transverse row of punctures on crest. Legs longer and slender. Type locality: Yosemite National Park................*tanneri* new species
8. Pronotal sides quite broadly and evenly arcuate from angle to angle; apical submarginal impressed area of the elytra with distinct punctules; abdominal smaller punctures well defined. Type locality: Tortuga Island, Gulf of California............*tortugensis* new species

Stibia puncticollis Horn

1870. *Stibia puncticollis* Horn, Trans. Amer. Phil. Soc., XIV, p. 260. (Revis. Tenebr.)

1874. *Stibia puncticollis* Horn, Trans. Amer. Ent. Soc., V, p. 29.

1894. *Stibia puncticollis* Horn, Proc. Calif. Acad. Sci., (2), IV, p. 346, Sept. 14.

1907. *Stibia puncticollis* Casey, Wash. Acad. Sci., IX, p. 448.

1923. *Stibia puncticollis* Blaisdell nec Horn, Proc. Calif. Acad. Sci., (4), XII, p. 237, July 10.
1925. *Stibia hannai* Blaisdell, Proc. Calif. Acad. Sci., (4), XIV, p. 329, Sept. 5.

On account of certain obscure statements it is desirable to repeat Dr. Horn's description for the purpose of analysis and elucidation. The original description may be restated as follows:

Black and shining. Head coarsely and confluently punctured. Thorax one-half broader than long, moderately convex, anteriorly feebly emarginate, posterior feebly sinuate, angles distinct; sides broadly rounded, margin acute; coarsely and densely punctured. Elytra convex, elongate, oval, with nine rows of strong punctures on the disk, one marginal row and a short scutellar row of three or four punctures. Beneath coarsely and densely punctured. Legs ferruginous brown. Length .32–.38 inch.

Dr. Horn compared *Stibia* with *Triorophus* and therein lies confusion. In his differential synoptic table he mentions the basal mandibular teeth and says nothing regarding the porrect teeth that are present.[11]

A detailed description of the species is now given:

Form subfusiform-ovate, slightly robust, comparatively small and variable in size; subacute posteriorly and obtusely rounded anteriorly, about twice as long as wide. Color piceous to black; legs and antennae more or less rufo-piceous. Luster more or less shining, slightly alutaceous.

Head a little more than twice as wide as long, widest across the eyes (Pl. IV, fig. 1.); sides (lateral lobes of Horn) feebly arcuate and moderately convergent anteriorly to the angles, the latter strongly and inwardly rounded to the cicatrices of the oblique sutures; epistomal ridge not prominent, feebly convex and less marked in middle third, lobe obliquely deflexed, triangular and subacute at apex, margin obscurely serrulate, surface moderately convex. Frons slightly convex, somewhat deeply impressed within the moderately prominent supra-antennal convexities, less so across middle against the ridge, supraciliary carinae rather well marked and extending forward, bounding the preocular impressions internally; surface very coarsely and strongly punctate, punctures more or less oval and at times somewhat annulate, appearing slightly open anteriorly, toward the sides more or less longitudinally subconfluent, the intervals convex, linear and more or less reticulate; punctures smaller at sides, on epistomal ridge and lobe. Eyes ovate, facets moderate in size and feebly convex. Antennae slender (Pl. V, fig. 22.) moderate in length and equal to width of pronotum, extending to the pronotal base; outer three segments wider and compressed, five to eleven quite equal in length; second short, obconical

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[11] Trans. Amer. Ent. Soc., v, p. 30, 1874.

and one-half longer than wide; third and fourth elongate, the former about one-fourth longer than the latter, which is one-third longer than the fifth; segments five to eight inclusive obconical and twice as long as wide, nine and ten obconico-triangular and a little longer than wide, eleventh suboval.

Pronotum subquadrate, about one-half wider than long (Pl. IV, fig. 3.); apex one-seventh wider than the head, truncato-emarginate, feebly and subobsoletely margined, angles small, distinct and everted; sides broadly arcuate, slightly emarginate behind the apical angles, rather less arcuate and straighter to feebly sinuate in basal one-fourth, lateral margins subacute in anterior third, slightly thickened and narrowly rounded in posterior two-thirds, basal angles subrectangular and not in the least prominent; base equal to apex in width, arcuate in middle third, thence broadly sinuate to the angles, marginal bead wide and flat. Disk strongly convex, somewhat arcuately declivous toward the angles; lateral submarginal impressions feebly defined behind apical third, narrow and finely punctate, not glabrous; surface densely punctate, punctures coarse, more or less subcoalescent, intervals convex, line-like and reticulate.

Propleurae finely punctate. Hypopleurae coarsely punctate, punctures large, round and quite discrete; coxal convexities more or less punctate. Prosternal punctures large, discrete, close and slightly impressed.

Elytra elongate oval, one-half longer than wide, about two and four-fifths times as long as the pronotum; base slightly emarginate, feebly and irregularly margined, scutellum transverse and small, humeri feebly angulate beneath the basal pronotal angles, sides broadly and evenly arcuate, convergent in apical fourth to apex, the latter parabolically rounded and feebly emarginate at the suture. Disk strongly convex, arcuately and evenly declivous laterally and moderately inflexed, marginal bead fine and slightly reflexed, apical declivity moderately arcuate and oblique, submarginal apical area more or less narrowly and feebly impressed, gradually narrowing laterally to become continuous with the lateral linear submarginal groove; strial series of punctures well marked throughout the surface, moderately coarse, slightly impressed individually and separated by a distance more or less equal to their diameters, becoming slightly smaller on the apical declivity; intervals flat, slightly convex laterally, very sparsely and more or less distinctly punctulate; scutellar area more or less irregularly punctate.

Mesosternal and metasternal punctures large and round, those of the episterna similar; mesosternal epimera with three or four small punctures.

Abdomen moderately convex, coarsely punctate, punctures slightly smaller centrally and on the fifth segment. First segment equal in length to the fourth and fifth together, third as long as fifth, second one-third longer than the third, the latter twice as long as the fourth. Legs moderate in length and stoutness. Metatibiae a third longer than their metatarsi. First metatarsal segment as long as third and fourth together, fourth twice as long as second, the latter one-third longer than the third.

Male. Usually somewhat smaller and less inflated than the opposite sex, size variable. First abdominal segment with a comparatively large, oval pubescent fovea (Pl. V, fig. 29.) across the posterior intercoxal line, hairs short and soft.

Female. More or less slightly inflated and frequently larger than the male. Last abdominal tergite rather broadly sinuate at apex and with a short process arising from bottom of the sinus; process about as long as wide, subconical with apex somewhat broadly rounded, projecting but moderately beyond the apices of the lateral lobes.

Type in the Horn collection, American Entomological Society, no. 3907.

An accompanying *paratype* has been studied which bears a " Cal." label and a blue paratype label no. 3907, with the name " *Stibia puncticollis.*"

Dr. K. G. Blair of the Entomological Department, British Museum, has informed me that there is a specimen in the Museum collection that was received from Dr. Horn, that it is marked " type " and is one of those collected by Mr. Wm. Gabb. There is a specimen in the collection of the Museum of Comparative Zoology, Harvard College. There is also, a small series in the collection of the Museum of Natural History, Balboa Park, San Diego, California. It is rare in collections. About fifty specimens are in the collection of the Entomological Department of the California Academy of Sciences.

Distribution.—Islands off the coast of Lower California, Mexico: Angulo Rock, Asuncion Island, August 1, 1922, (Hanna and Slevin); Natividad Island, August 3, 1922; San Geronimo Island, May 20, 1926; North Coronado Island, May 6, 1928, (Thos. Craig).

On the main land of Lower California: San Quentin, June 7, 1925; Enscnada, August 30, 1933.

In California, U. S. A.: San Diego, (W. G. Wright; at Coronado, south of the Hotel del Coronado, October 10, 1891 and of more recent date, (Blaisdell and Geo. Field.)

A small series of specimens showing an extreme type of sculpturing, from an isolated geographical area is defined as a new subspecies:

Stibia puncticollis martinensis new subspecies

The extreme form of sculpturing of head and pronotum is the main subspecific character separating *martinensis* from *puncti-*

collis Horn. In the former the intervals between the punctures are much more prominent and coarser, being best described as rugose. In the latter the intervals are narrower, linear and, convex, appearing retriculate, with the punctures less deeply placed in the meshes.

Coarsely and strongly punctate throughout. Head and pronotum rugoso-punctate, in irregular longitudinal series and more or less confluent. Strial series on apical declivity of elytra entire. Otherwise as in *puncticollis* Horn.

Measurements.—(Types) Length 8.0 to 8.5 mm.; width 4.4 to 4.5 mm.

Holotype.—Male; San Martin Island, Lower California, Mexico, June 8, 1925. (H. H. Keifer). [Cal. Acad. Sci., no. 3997]. *Allotype,* female, with same data, no. 3998.

Paratypes.—3 males, 2 females; with the same data. [Cal. Acad. Sci.]

Seven specimens studied.

One paratype placed in the collection of the American Entomological Society.

A specimen was taken by Mr. Keifer at San Quentin, Lower California, June 7, 1925.

Stibia hannai Blaisdell is identical with *puncticollis* Horn and falls into synonymy. The types of *hannai* are located in the collection of the Museum of the California Academy of Sciences. Type locality: Angulo Rock, Asuncion Island, Lower California.

In October, 1891, the writer collected three specimens of a species of *Stibia* on the Coronado peninsula, San Diego, California, about one-half mile south of the Hotel del Coronado. They were taken from chip dirt and leaves under or near sumach bushes (*Rhus integrifolia* Nutt.) just inland to the sand dunes, Mr. Geo. Field has secured several specimens from other parts of the Coronado peninsula; his specimens are now located in the collection of the Museum of Natural History, Balboa Park, San Diego.

When Dr. Horn described *Stibia puncticollis,* he compared it with *Triorophus* Lec. and had no way of knowing that other species would be discovered that would have the lateral pronotal margin thickened and obtusely rounded. *Triorophus* has a dorsal tooth or tumescence at base of each mandible which *Stibia* does not have. Both have porrect mandibular teeth although Dr. Horn did not say so. These facts led Col. Casey to erect a new genus for a species collected near Tucson, Arizona.

Dr. Horn in describing the lateral pronotal margin as sharp in *puncticollis,* caused the author to consider a different species inhabiting the main land of lower California as the true *puncticollis,* and which is described at the present time as *fallaciosa* which has the lateral pronotal margin sharp and beaded; the bead is of the same width throughout and not the least thickened.

In *puncticollis* Horn the pronotal lateral margin while apparently sharp, is as a matter of fact, slightly thickened in posterior one-half and very narrowly rounded. It is a very distinct species and very variable in size. The variants could be considered as varieties or subspecies, if these were not connected by an abundance of intermediates. The typical form inhabits the mainland of lower California and are the largest in size; the smallest occur on North Coronado Island, and those taken at San Quentin on the main land are similar, but show gradual increase in size toward typical *puncticollis.* The San Quentin specimens are very coarsely punctured beneath, while those taken at San Diego, California, and Ensenada, Lower California, have the abdomen much more finely punctate, while the form taken on Asuncion Island is intermediate in coarseness of abdominal punctation.

Puncticollis Horn is easily recognized by the dense, coarse punctation of the frons, the punctures toward the sides are arranged in rows between very convex, linear intervals, the pronotal punctation is quite similar. The males have the pubescent abdominal fovea, which is not present in species of Groups A, B and C. The lateral pronotal margin is sharper than in any other species of Group D, and the posterior one-half of the margin is obtusely but narrowly rounded, while the submarginal area is feebly impressed, but not glabrous and impunctate, quite to the contrary punctate and in appearance not different from the rest of the disk; besides it belongs to that section of Group D where the species have the elytral striae of punctures distinct on the declivity before the apex and, has to be differentiated from *williamsi* Blaisdell. The latter species is larger and more ovate, the males being without the abdominal pubescent fovea.

Stibia sparsa Blaisdell

1923. *Stibia sparsa* Blaisdell, Proc. Calif. Acad. Sci., (4), XII, p. 237, July 10.

This species is most closely related to *williamsi* Blaisdell in appearance, from which it differs markedly by the discrete punctation of the frons, small and slightly more acute apical pronotal angles, lateral pronotal margins differing more or less in the sexes, with the submarginal impressed area more irregular in the male, in the evenly arcuate margin of the female, and the obsolescent punctation of the apical declivity of the elytra, as well as the secondary sexual characters of both sexes.

Form ovate, about two and one-fourth times as long as wide, elytra somewhat inflated at times, resembling a *Triorophus* at first sight. Color rufo-piceous to piceous; antennae and palpi rufous, legs more or less rufopiceous. Luster glabrous and shining.

Head about one-third wider than long, widest across the eyes (Pl. III, fig. 8.); sides moderately convergent, somewhat arcuate to the strongly and inwardly rounded angles, quite as far as the cicatrices of the oblique sutures; epistomal lobe rather abruptly deflexed, triangular, subacute at apex, margins finely serrulate, surface feebly convex; ridge narrow, obtuse and continuous with the sides. Frons feebly convex in the central area, more strongly so to vertex, quite strongly and broadly impressed. abruptly so against the ridge, more deeply so laterally within the moderately convex supra-antennal convexities; supraciliary carinae fine, distinct, extending forward and bounding the preocular impressions internally; surface coarsely and almost discretely punctate, punctures sometimes denser laterally and arranged in rows, slightly smaller, dense, laterally, on ridge and lobe. Eyes ovate (Pl. V, fig. 12.), moderate in size, sometimes microscopically setose, very slightly more prominent than the sides; facets moderate in size and very feebly convex. Last segment of maxillary palpi triangular. Antennae long and slender (Pl. V, fig. 21.), extending about three segments beyond the pronotal base; segments two to eight inclusive, elongate and cylindrico-obconical; second, fifth, seventh, eighth and eleventh equal in length, each twice as long as wide at apex; third segment as long as the combined lengths of nine and ten, as well as three times as long as wide; fourth two and one-half times as long as wide, equal to sixth in length; ninth and tenth triangular and equal in length, ninth one-fourth longer than wide and a little wider than preceding segments, tenth widest and as long as wide, eleventh oval and not as wide as tenth.

Pronotum about one-fourth wider than long (Pl. IV, figs. 4 and 5); apex about one-sixth wider than head, truncato-emarginate between the slightly prominent and subacute angles, somewhat beaded in lateral thirds; sides somewhat different in the sexes (*ut infra*), margins thickened and more or less obtusely rounded; base subequal to apex, broadly arcuate in middle two-fourths, thence broadly sinuate to the obtuse but distinct angles which are not in the least prominent, marginal bead wide, flat and slightly declivous posteriorly. Disk strongly convex, noticeably declivous toward the angles; lateral submarginal impressions distinct and slightly concave, obsoletely punctulate and slightly different in the sexes; surface rather sparsely punctate, punctures small, most so in the central area and region of the apical angles.

Propleurae sparsely punctulate and quite smooth. Hypopleurae coarsely punctate, punctures shallow, well separated and more or less open anteriorly, intervals not notably convex; coxal convexities impunctate. Prosternal punctures round, strong and discrete.

Elytra evenly oval, about one-half longer than wide, two and four-fifths times as long as pronotum, apex not lobed; base emarginate and adapted to middle two-fourths of pronotal base, marginal bead rather fine, humeri obtuse beneath the pronotal basal angles; scutellum small, transverse and in line with basal margin; sides evenly, broadly arcuate to the obtuse and subogival apex, the latter scarcely emarginate at the suture. Disk evenly and moderately convex, strongly so laterally, arcuately declivous and moderately inflexed, apical declivity moderately arcuato-oblique, with surface dull in luster; apical submarginal impression more or less obsolete; strial punctures moderately large and strong, each very feebly impressed, becoming gradually smaller and obsolescent on apical declivity; intervals scarcely convex laterally, very sparsely, minutely to subobsoletely punctulate.

Mesosternum metasternum and parapleurae coarsely punctate, punctures round, deep, well and irregularly spaced. Mesosternal epimera impunctate.

Abdomen moderately convex, punctures very sparse, small, almost minute on third and fourth segments, largest on first segment in vicinity of the coxae and process, intermediate in size and dense on fifth. First segment on median line a little longer than the second and equal to the combined lengths of fourth and fifth; third about twice as long as the fourth and one-third of its own length shorter than the second. Legs moderate in length and slender. Mesofemora and metafemora notably slender and subparallel. Metatarsi about two-thirds as long as their tibiae; first segment as long as third and fourth together, fourth equal to the second and third together, second one-third longer than the third.

Male. Usually somewhat smaller in size. Sides of pronotum more or less biarcuate, due to a feeble sinuation just before the middle, briefly sinuate behind the apical angles and more feebly so before the basal; lateral submarginal areas of disk more broadly impressed, especially opposite to the marginal sinus, the discal convexity arising somewhat more abruptly from the impressions. Abdomen with a moderate oval pubescent fovea (Pl. V, fig. 30.) across the post-coxal line at middle of first segment; the hairs rather coarse and longer than in *puncticollis* Horn (vide Pl. V, fig. 29.).

Female. Usually the larger, elytra somewhat inflated. Pronotal sides rather strongly arcuate (Pl. IV, fig. 5.), feebly sinuate behind the apical angles, somewhat straighter to scarcely sinuate before the basal; lateral submarginal impressions of the disk distinct, rather narrow, moderately concave and subentire. Last abdominal tergite rather deeply sinuate at apex, the process arising from the sinus, as long as wide with the sides convergent and apex truncate (Pl. V, fig. 18.).

Measurements.—Types: Length 8 to 8.5 mm.; width 2.9 to 3.5 mm.

Distribution (23 specimens studied.—South Santa Inez Island, Gulf of California, May 13, 1921, (E. P. Van Duzee), [*holotype*, female, no. 1142; *allotype*, male, no. 1143; *paratypes*, 5 males and 9 females; Cal. Acad. Sci.]. Angeles Bay, Lower California, May 5–7, 1921, (J. C. Chamberlin and E. P. Van Duzee). San Lorenso Island, Gulf of California, June 24 and May, 1921, (J. C. Chamberlin). Sal si Puedes Island, Gulf of California, May 9, 1921, (J. C. Chamberlin).

In *williamsi* the frontal punctation is very different and the abdominal pubescent fovea is absent in the male. The species described below are more elongate and the form is more subfusiformovate than ovate.

Stibia blairi new species

Blairi is a distinct and readily recognized species. It agrees with *puncticollis* Horn in having the elytral punctures well defined and strong on the declivity before the apex; in all of the other species of Group B, the punctures are obsolescent on the declivity, those that are present are greatly reduced in size. Fortunately, the paratype is a male and has the abdominal pubescent fovea. *Puncticollis* is a smaller species with the frontal punctures large and more or less confluent, arranged in rows between very convex and linear intervals; the lateral pronotal margins are evenly arcuate and thin from apex to base, with the submarginal impressed area poorly defined and punctate. The tergal process of the female is similar to that in *blairi*, but less prominent and with the lateral lobes more prominent, the sinuations are deeper.

Blairi is also a larger species, with the frontal punctures discrete and rather widely spaced; the lateral pronotal margins are more or less sinuate at middle, with the margin distinctly thickened and obtuse behind the middle, and the submarginal impressed area is well defined, almost glabrous and convex antero-posteriorly. The antennae are markedly more elongate (Pl. V, fig. 26.), while in *puncticollis* they are shorter and the segments much less elongate (Pl. V, fig. 22.).

Form subfusiform, elongate, rather subacute posteriorly and rounded anteriorly at the epistomal ridge, almost twice as long as wide. Color piceous tinged with rufous. Surface smooth, shining and more or less finely alutaceous. Pubescence very minute, except a little longer on labrum, antennae, tempora and dorsal surface of the mandibles, and a varying number of long hairs on prosternum; the setiform hairs of the femora are recumbent, the spinules of the tibiae are short and not conspicuous; on the abdomen the hairs are somewhat longer than on the femora and recumbent, a few long, erect setiform hairs are present and resemble ambulatorial setae.

Head relatively small, about twice as wide as long (Pl. IV, fig. 15.); sides before the eyes arcuate in continuity with the epistomal ridge, the latter obtusely convex and somewhat prominent, due to the strongly impressed adjacent surface of the frons, impression stronger laterally within the supra-antennal convexities, the latter feebly convex antero-posteriorly and rather strongly declivous against the eyes; epistomal lobe almost vertically deflexed; supraciliary margin not strongly carinate. Frons discretely and coarsely punctate, punctures slightly irregular, separated by a distance equal to one-half to that of their diameter, smaller laterally, and on the ridge and lobe Eyes feebly convex, very slightly more prominent than the sides of the head; ovate and with the facets somewhat coarse and feebly convex. Antennae slender (Pl. V, fig. 26.), extending to about basal sixth of elytra; segments nine, ten and eleven noticeably widened; two, five and seven quite equal in length (condyles excluded); second segment slightly obconical and twice as long as wide, third to the seventh inclusive quite equal in width, elongate and cylindrico-obconical; third longest, about four times as long as wide, one and two-thirds times as long as second; fourth segment three times as long as wide and slightly longer than the fifth, the latter slightly longer than the sixth; the latter and seventh each three times as long as wide; eighth a little wider, feebly obconical and twice as long as wide, ninth obconico-triangular and about as long as wide; tenth triangular and as long as wide, eleventh not so wide, oval, slightly narrowed apically and twice as long as wide.

Pronotum about a third wider than long (Pl. IV, fig. 9.); apex truncate, feebly margined laterally, angles small, acute and feebly prominent; lateral margins more or less sinuate a little before the middle, feebly arcuate anteriorly and slightly sharper but not distinctly margined, a little more strongly arcuate behind the sinuation and the margin moderately thickened and obtusely rounded. Disk strongly convex and declivous toward the angles, moderately coarsely punctate, punctures somewhat irregularly spaced and separated by a distance equal to one-half to twice their diameters;

submarginal impressed area moderately wide and well defined behind the sinuation, glabrous, more or less impunctate and antero-posteriorly convex; base equal to apex in width, arcuate in middle third and broadly sinuate laterally, lobe slightly more prominent posteriorly than the angles, the latter small and subrectangular, basal bead moderately wide and flat.

Propleurae smooth and very sparsely punctulate. Hypopleural punctures large, round, discrete, shallow and evenly concave, appearing to be more or less open anteriorly; coxal convexities glabrous and impunctate. Prosternal punctures similar, entire and quite widely separated; process arcuate between the coxae.

Elytra one-half longer than wide and almost three times as long as the pronotum; base broadly and slightly emarginate, marginal bead irregular and feeble, scutellum a little wider and arcuate at apex, humeri obtuse beneath the basal pronotal angles; sides broadly and rather strongly arcuate, becoming more strongly convergent in apical fifth to the obtuse and subogival apex, the latter feebly emarginate at the suture; strongly convex, somewhat less so in the central area, arcuately declivous laterally and moderately inflexed, gradually and obliquely declivous in about apical fourth; strial punctures sharply defined, each slightly impressed, separated by a distance equal to two or three times their diameters, the series regular and not at all obsolescent before the apex but slightly smaller; intervals slightly irregular in width, especially between the first and second, fourth and fifth striae, each with an irregular series of very sparse and minute punctures. The scutellar series consist of three or four punctures.

Epipleurae with a few scattered punctules in basal one-fourth. Mesosternal and metasternal punctures slightly larger but otherwise as on the prosternum; metepisterna with a single series of about six punctures.

Abdomen moderately convex, punctures small and widely spaced, coarser on first segment about the coxae, denser on fourth and fifth segments and larger than on segments two and three, but larger on the fifth than on the fourth segment. First segment three times as long as fourth and slightly longer than second; the latter about one-half longer than third, which is twice as long as fourth and equal to fifth. Legs moderate in length and slenderness. Metatibiae a little longer than the metafemora. Metatarsi a little less than two-thirds as long as their tibiae; basal segment twice as long as second, fourth one-third longer than the latter, which is one-half longer than third. Median salient of last abdominal tergite much more prominent than the lateral rounded lobes (Pl. V, fig. 19.), as wide as long, with sides converging to the broadly rounded apex, sinuations shallow.

Measurements.—(Type) Length 12 mm.; width 4.5 mm.

Holotype.—Sex undetermined; California Meridionalis. [Fry collection, Brit. Mus., green label n. 68600].

One imperfect *paratype* is in the author's collection, kindly donated by Dr. K. G. Blair, of the British Museum, to whom I dedicated the species.

Stibia tuckeri Casey

1924. *Eutriorophus tuckeri* Casey, Mem. Coleop., XI, p. 297.

Tuckeri Casey is a distinct species, noticeably less robust than *imperialis* and *tanneri*, the body surface is alutaceous and more or less feebly shining; the head and prothorax are relatively and comparatively smaller than in any other species known to the author; the abdomen is finely, sparsely and subobsoletely punctate centrally and laterally. In *tortugensis* one of the larger and stoutest species, the head and prothorax are relatively and comparatively large, the body surface is dull in luster. *Imperialis* and *tanneri* are shining and not visibly alutaceous except on the apical declivity of the elytra, the strial punctures are much larger than in *tuckeri*. *Sparsa* and *williamsi* are more ovate and the elytra more inflated than in *tuckeri*, where the form is subfusiform-ovate. *Puncticollis* Horn is a comparatively small species, the frons is coarsely and confluently punctate; in *tuckeri* the punctures are discrete. In *blairi* the sides of the pronotum is more or less sinuate at middle, and the submarginal area behind the sinuation, glabrous and convex antero-posteriorly.

For the purpose of presenting a corresponding sequence of descriptive facts the writer has rearranged Casey's description as follows:

Moderately ventricose, convex, shining, deep black throughout and glabrous.

Head three-fifths as wide as the prothorax, subquadrate, a little wider than long, strongly, rather closely punctate, broadly and obtusely lobed in middle of apex, the lateral lobes much more retracted and rounded; within each the surface is feebly impressed but there is no such long concavity as is seen along the outside of the tumidity of *Triorophus*. Antennae slender, somewhat longer than the head and prothorax, the fourth joint evidently longer than the second and correspondingly shorter than the third; outer three joints wider, the eleventh barely longer than wide, very slightly narrower, oval.

Prothorax two-fifths wider than long; base bisinuate and thickly beaded, somewhat wider than the feebly sinuate apex, which has small, sharp and slightly everted angles, widest slightly beyond the middle, the sides broadly arcuate, the basal angles slightly blunt; surface strongly convex, very feebly impressed along the middle, abruptly concave and narrowly explanate along the sides, very narrowly at apex; punctures deep, smaller and closer than those of the head, sparse medially and almost wanting at the reflexed sides. Scutellum small, tumid, transversely oval.

Elytra oblong oval, three-fifths longer than wide and somewhat more than one-half wider than the prothorax; striae regular, almost unimpressed, strongly but not closely punctate, the punctures obsolete rather abruptly at apex; intervals smooth, gradually alutaceous apically; sterna coarsely, loosely punctate.

Abdomen strongly, sparsely punctate at base, gradually very minutely so. Legs moderately long, the tibiae with minute sparse hairs, the tarsi rufo-piceous.

Measurements.—(Type) Length 10.0 mm.; width 4.0 mm.

Type.—Female; taken near Tucson, Arizona, by J. F. Tucker. In the Casey collection, U. S. Nat. Museum.

The species is new and redescribed from specimens at hand other than the type, as follows:

Form elongate, subfusiform-ovate, widest across middle of elytra and about two and one-half times as long as wide. Head and prothorax relatively small. Color nigro-piceous, antennae and legs rufo-piceous, palpi dark rufous. Luster feebly shining, otherwise dull and more or less alutaceous.

Head two-fifths wider than long, widest across the eyes (Pl. IV, fig. 18.); sides moderately convergent, feebly arcuate, angles broadly rounded and inwardly oblique to the cicatrices of the oblique sutures; epistomal lobe obtusely triangular, moderately deflexed, ridge feeble and scarcely prominent centrally. Frons slightly convex, feebly impressed anteriorly at base of the lobe, moderately strongly impressed laterally within the supra-antennal convexities, the latter not strongly convex and moderately declivous against the eyes; supraciliary carinae feeble, scarcely bounding the preocular impressions internally; punctures coarse and discrete, dense to rather sparse centrally and with a median elongate impunctate space below the vertex, mostly separated by a distance less than their own diameters, smaller laterally and on the epistomal ridge and lobe. Eyes oval to subovate, rather large, not setose, rather less emarginate anteriorly than usual, slightly prominent and rather less sunken below the frontal plane than usual. Antennae long and slender, extending about three segments beyond the pronotal base (Pl. V, fig. 10.); segments two to eight inclusive elongate and cylindrico-obconical, ninth and tenth slightly and gradually wider; second segment as long as seventh and twice as long as wide, third as long as ninth and tenth together, about one-sixth longer than fourth and four times as long as wide; fourth and fifth equal in length and three times as long as wide; sixth, seventh and eighth subequal in length and twice as long as wide; segments nine and ten subtriangular, equal in length and noticeably longer than wide, eleventh subovate, as long as eight and as wide as the tenth.

Pronotum about a third wider than long (Pl. IV, fig. 6.), apex truncato-emarginate, beaded in lateral thirds, angles subacute, small and feebly everted, slightly prominent; sides broadly arcuate, sinuate behind the apical and more broadly so before the basal angles, margin obtuse (Pl. III, fig. 13.); base subequal to apex, broadly arcuate in middle two-fourths, sinuate laterally, marginal bead abruptly prominent, very coarse and flat, angles distinct, subrectangular and made slightly prominent by the beading. Disk strongly convex, declivous toward the angles, lateral margins thickened and obtusely rounded, very narrowly so in apical third, less widely so in basal thirds, submarginal area more or less concavo-explanate; punctures discrete, smaller than on the head, more widely spaced centrally, less so laterally, a median impunctate line more or less evident, lateral impressed area not glabrous and more finely punctate.

Propleurae more or less impunctate, punctules small when present. Hypopleural punctures very large, shallow and more or less open anteriorly, coxal convexities more or less impunctate. Prosternal punctures large, rather deep and discrete, each with its anterior margin somewhat more prominent.

Elytra oval, about one-half longer than wide, less than three times as long as the pronotum, humeri obtuse beneath the basal pronotal angles; base feebly emarginate centrally, bead fine and scarcely irregular; sides broadly and evenly arcuate, converging in apical fourth to the obtusely subogival apex, the latter feebly emarginate at the suture. Disk somewhat depressed and moderately convex centrally, strongly so laterally and arcuately declivous and very moderately inflexed, apical declivity arcuately oblique to the end of the suture, the apical submarginal impressed area rather feeble and irregular, not evident across the suture; strial punctures moderately small and not impressed, separated by a distance equal to three or four times their diameters, becoming gradually smaller and obsolescent on apical declivity, scutellar series of three or four distinct punctures; intervals not convex and obsoletely punctulate.

Mesosternal, metasternal and parasternal punctures large, round and well separated; epimera impunctate. Prosternal punctures similar, rather deep and the intervals rather convex.

Abdomen moderately convex, punctures very small and sparse, more or less obsolescent, larger on base of first segment in vicinity of the coxae and process; dense and intermediate in size on fifth segment. First segment on median line as long as third and fourth together, behind the coxae as long as third; second as long as fourth and fifth together, third twice as long as fourth. Legs slender and moderate in length. Metatarsi two-thirds as long as their tibiae; first segment as long as third and fourth together, second and third quite equal in length and together two-thirds as long as the first.

Male described above measures 10.5 mm. in length and 4.5 mm. in width. A pubescent fovea is present on the first abdominal segment, it is small and situated at base of the intercoxal process across the post-coxal line; the hairs are rather coarse.

Two specimens have been studied and referred to *tuckeri* Casey, both males, the type being a female. One of the males is in the author's collection, Museum of the California Academy of Sciences, collected August 1, 1913, near Tucson, Arizona, the type locality. The other male is in the collection of Roy L. Wagner of Fresno, California; the specimen was collected August 15, 1929, in the Pinal Mountains, Gila County, Arizona.

Stibia imperialis new species

Imperialis is one of the larger species and has the frontal and pronotal punctures discrete and not at all coalescent; the pronotum has evidence of an imperfect median and impunctate line, the lateral concave area sparsely punctulate; crest of the epistomal ridge rather sharp and abruptly formed by the frontal impression, the procoxal convexities are impunctate and glabrous, the eyes are evidently smaller than in *tanneri*, and the elytral strial punctures become obsolescent nearer the apex than in the latter.

In *tanneri* the apical pronotal angles attain their largest size, are divergent and reflexed by the lateral apical bead; the pronotal sides are more strongly and broadly arcuate and less sinuate posteriorly. *Tortugensis* attains the largest size, with the surface dull and alutaceous, the abdominal punctures are larger and more distinctly defined; in *imperialis* the body surface is polished and glabrous, the abdomen for the most part almost subobsoletely and minutely punctate, The submarginal surface of the elytral apex is impunctate in *imperialis*, while small and distinct punctures are present in *tortugensis*. In the specimens of *imperialis* from Mason Valley, San Diego County, the strial punctures of the elytra are smaller than in the type, and partially distinct on apical declivity to apex, although for the most part obsolete. Compare the differential characters as given under the other species.

Form comparatively large, subfusiform-ovate, subogival posteriorly, obtusely rounded anteriorly at the epistomal ridge, elongate and one and one-half times as long as wide. Color piceous, antennae, palpi and legs rufous, the latter sometimes rufo-piceous. Luster shining and glabrous.

Head about a third wider than long, widest across the eyes (Pl. IV, fig. 17.); sides before the eyes nearly straight, slightly convergent, angles broadly rounded to the position of the cicatrices of the oblique sutures and there sinuate; epistomal lobe moderately deflexed, transverse, broadly arcuate to subangulate at apex and comparatively short, surface slightly convex, margin serrulate; ridge obtusely angulate at summit, not broad and moderately prominent. Frons more or less moderately convex, broadly impressed, most so along the position of the forntal suture, defining the ridge, and laterally within the moderately convex and rather prominent supra-antennal convexities, the latter declivous against the eyes, the declivity bounded within by the supraciliary carinae which are fine but distinct. Central area moderately, coarsely and irregularly punctate, punctures discrete with small impunctate areas present, laterally and on the epistomal ridge and lobe the punctures are smaller and dense. Eyes ovate, moderate in size, not setose, upper lobe the larger. Antennae long and slender, extending about three segments beyond the pronotal base (Pl. V, fig. 9.); outer four segments compressed and scarcely widened; two to nine inclusive elongate and cylindrico-obconical; segments two, four and five quite equal in length and about three times as long as wide; second a little stouter; third longest, twice as long as ninth and almost four times as long as wide; segments six, seven and eighth shorter and quite two and one-half times as long as wide; ninth obconical, tenth subtriangular and noticeably longer than wide, eleventh oblong-oval and twice as long as wide.

Pronotum one-third wider than long, apex truncato-emarginate and equal to base in width (Pl. IV, fig. 12.), somewhat broadly and feebly margined laterally, angles small, subacute and slightly prominent; sides broadly and moderately arcuate, slightly sinuate behind the apical angles, broadly and feebly so before the basal; lateral margins moderately thickened (Pl. III, fig. 12.), obtusely rounded, somewhat feebly beaded in apical third (viewed from above); base broadly and arcuately lobed in middle third, thence broadly but not deeply sinuate to the small, distinct and subrectangular angles, marginal bead flat and coarse. Disk strongly convex, declivous toward the angles, lateral submarginal impressed area narrow and slightly concave, attenuated anteriorly but not attaining the apical angles; surface linearly impressed against the basal bead, irregularly punctate, punctures sparse centrally and a median impunctate line more or less evident, moderate in size and discrete throughout, separated by a distance equal to one-half to two or three times their diameters; punctures very small in the marginal and impressed areas.

Propleurae smooth, punctures small and sparse. Hypopleurae coarsely punctate round and shallow, some open anteriorly, at times tending to form rows but discrete; coxal convexities impunctate. Prosternal punctures large, perforate and rather densely placed.

Elytra oval, about one-half longer than wide, not quite three times as long as the pronotum; base broadly emarginate, well margined, humeri very obtuse beneath the basal pronotal margin; scutellum small, transverse, slightly angulate at apex and in line with the basal bead; sides broadly and evenly arcuate, convergent in apical fourth to the subogival apex, the latter feebly emarginate at the suture. Disk strongly convex, arcuately declivous laterally and moderately inflexed, apical declivity quite oblique, feebly arcuate and more or less dull in luster; apical submarginal area not impressed across the suture and feeble laterally; surface with regular series of moderately large and deep punctures, that are slightly and individually impressed, these gradually become smaller and obsolescent before the apex in apical third; the punctures are somewhat irregular and larger in the basal and scutellar areas, throughout seperated by a distance more or less equal to their diameters; intervals flat, quite equal and very sparsely punctulate.

Sterna and episterna with large, round, somewhat perforate and closely placed punctures; mesosternal epimera with two or three punctules.

Abdomen moderately convex, notably shining and very sparsely punctate. Punctures small, widely spaced, larger in vicinity of the intercoxal process; denser, well defined and intermediate in size on fifth segment. First segment behind the coxae as long as the fifth, second about as long as fourth and fifth together, third twice as long as fourth. Legs moderately long and slender. Metatibiae not quite as long as their femora. Metatarsi about five-sevenths as long as their tibiae; first segment nearly as long as the third and fourth together, the latter twice as long as third, the second about one-fourth longer than the latter.

Male. Usually somewhat narrower and smaller, elytra less apt to show inflation. Frontal impressions deeper within the supra-antennal convexities, impunctate areas larger. Epistomal lobe a little longer, subtriangular; antennae somewhat longer. Pubescent fovea of first abdominal segment oval, mostly behind the post-coxal line, hairs rather coarse.

Female. Described above. Usually larger, elytra may be more or less inflated. Last abdominal tergite (Pl. IV, fig. 22.) deeply sinuate each side of median process; the latter conical, width of base equal to the length, very sparsely pubescent; lateral lobes obtusely angulate at apex, depth of each sinus equal to one-half of the length of the process.

Measurements.—(Types) Length 10 to 11 mm.; width 4.25 to 5.0 mm.

Holotype.—Female; La Puerta, Imperial County, California, Oct., 1925. [Author's collection, Cal. Acad. Sci., no. 3948]. *Allotype.*—male; same data, [no. 3949.]

Paratypes.—3 males, 4 females; with same data as type [Cal. Acad. Sci.; Mus. Nat. Hist., Balboa Park, San Diego, California]; 2 from Mason Valley, San Diego County, Mar 29, 1928; 2, Arizona, [Amer. Ent. Soc., Horn Collection, no. 7173.].

Distribution (in addition to type series.—CALIFORNIA: Imperial County. Mason Valley, San Diego County, May 16, 1912, (C. C. Searl). Andreas Valley, Riverside County, April 3, 1927, (Thos. Craig). ARIZONA: Papago Wells, Yuma County, April 16, 1912, (J. R. Slevin).

Stibia tanneri new species

Tanneri is as large as *imperialis* in size, variation is to be expected, surface smooth and shining, apical declivity of elytra dull and alutaceous, strial punctures begin to diminish in size a short distance behind the middle, becoming obsolescent some distance from the apex; submarginal area of apex not impressed across the suture. The frontal punctures are irregularly spaced, occurring here and there in lines of three or four but remaining discrete; small impunctate areas are conspicuous. Sides of head before the eyes are quite parallel and feebly arcuate to the rounded angles; frons somewhat more convex than usual and the eyes appear less abruptly depressed below the frontal plane, the supraciliary carinae are not well marked. Epistomal ridge rather sharp, due to abruptness of the frontal impression, its crest has a transverse row of punctures. On the pronotum the punctures are noticeably smaller than on the head, more evenly placed and very discrete throughout; the apical angles are large, everted and reflexed by the apical marginal bead. The procoxal convexities are impunctate and with some longitudinal rugae. Legs are longer and slender.

In *imperialis* the frontal punctures are smaller, more widely and more evenly spaced, epistomal ridge wider and less abruptly formed, supraciliary carinae stronger, terminal segment of maxillary palpi (Pl. III, fig. 10.) longer and less triangular; apical pronotal angles small and feebly prominent and the central area of the disk more sparsely punctate.

In *tortugensis* the size is large and stouter, body surface dull and alutaceous; frontal punctures denser although more widely spaced in the central area; epistomal ridge rather narrowly convex and abruptly formed by the broad and strong frontal impression. The under surface of body is more coarsely punctate, the abdominal punctures are larger and well defined.

Form elongate, subfusiform, subacute posteriorly, rounded anteriorly at the epistomal ridge, about one and three-sevenths times longer than wide. Color piceous, antennae and legs dark rufous. Surface smooth and shining, elytral apical declivity alutaceous.

Head about two-fifths wider than long, widest across the eyes (Pl. IV, fig. 16.); sides subparallel, feebly convergent, angles rounded and thence continuous with the epistomal ridge, and slightly sinuate across the position of the cicatrices of the oblique sutures; epistomal lobe abruptly deflexed and obtusely triangular, margins slightly irregular. Frons convex, vertex more strongly so; broadly impressed anteriorly against the narrow and rather abruptly formed epistomal ridge, more deeply so laterally within the somewhat prominent supra-antennal convexities, the latter well impressed and concave against the eyes, bounded within by the fine and feebly marked supraciliary carinae; surface coarsely, closely to more or less irregularly punctate, punctures smaller laterally, on lobe and ridge, the latter with a transverse row on summit. Labrum evidently subquadrate, sides evenly arcuate, apex sinuate at middle; surface feebly convex, a median impunctate line present, densely punctate, punctures small, sparser at apex. Eyes slightly more prominent than the sides, rather large and ovate, not setose; facets moderate in size and very slightly convex; sunken below the frontal plane but not abruptly so. Antennae slender and noticeably long, last five segments slightly and gradually wider, moderately compressed (Pl. V, fig. 8.) extending about three segments beyond the pronotal base; segments three to seven inclusive elongate and cylindrico-obconical, four to six inclusive equal in length and at least three times as long as wide, second and eighth equal in length and twice as long as wide; third segment longest, three and one-half times as long as wide; eighth triangulo-obconical and one-half longer than wide, ninth and tenth triangular and noticeably longer than wide, eleventh pointed oval and as long as ninth; last three segments nearly same width.

Pronotum a little less than one-half wider than long (Pl. IV, fig. 11.); apex one-sixth wider than head, equal to base in width, slightly emarginate in moderate circular arc, rather coarsely beaded in lateral thirds, angles comparatively large, everted, subacute and more or less reflexed by the apical bead; sides evenly and rather strongly arcuate, sinuate behind the apical angles, very briefly so posteriorly at the basal angles, margin distinctly thickened and obtusely rounded, less so anteriorly; base broadly lobed in middle third, thence broadly sinuate to the basal angles, the latter slightly prominent due to the marginal bead, the latter flat, broad centrally, narrowing laterally to the angles. Disk moderately strongly convex, more or less declivous toward the angles, coarsely, densely and somewhat irregularly punctate, punctures separated by a distance equal to one-half to slightly more than their diameters, discrete throughout; lateral submarginal areas narrowly impressed and noticeably concave, gradually narrowing anteriorly but not attaining the apical sinuations, surface smooth and sparsely punctate, punctures small.

Propleurae with small and sparsely placed punctures. Hypopleurae very coarsely punctate, punctures shallow, discrete, subangulate and more or less open anteriorly. Coxal convexities impunctate and more or less longitudinally rugose. Prosternal punctures a little smaller, deeper, sparse centrally, closer laterally and somewhat open internally.

Elytra one-half longer than wide, subfusiform-oval, about three times as long as the pronotum; base broadly sinuate centrally, feebly arcuate laterally, humeri obtuse beneath the basal pronotal angles, marginal bead rather strong and irregular, scutellum small and in line with the bead; sides broadly arcuate, subparallel in middle third, thence obliquely convergent to the obtusely ogival apex, the latter slightly emarginate at the suture. Surface moderately convex, evenly, strongly arcuate, but not very broadly declivous laterally and moderately inflexed; apical declivity arcuately and gradually declivous, slightly impressed on the suture; apical submarginal area more or less feebly impressed lateral to but not on the suture and gradually narrowing anteriorly to opposite the third abdominal segment; strial punctures moderately coarse, more or less feebly and individually impressed, separated by a distance equal to one-half to twice their diameters, gradually smaller a short distance behind the middle to become minute and obsolete before the apex; near the base the punctures are a little larger and stronger, more impressed and their anterior margins very slightly lunate; scutellar series irregular and scarcely smaller in size; intervals sparsely, distinctly and finely punctulate, third somewhat widest.

Sternal and parasternal punctures large, rather deep, round and more or less irregularly spaced; epimera impunctate as usual

Abdomen moderately convex, finely and very sparsely punctate, punctures moderately large on first segment about the coxae and process, small, well defined and denser on fifth segment. Median process of apex of last abdominal tergite conico-triangular (Pl. V, fig. 17.), narrowly rounded at tip, about a third of its length more prominent than the lateral lobes, the latter subangulate at apex, sinuses rather deep and rounded at bottom. First segment three times as long as fourth, second one-third longer than third and as long as fifth, third twice as long as fourth. Legs slender and moderate in length. Metatarsi about four-sevenths as long as their tibiae; first segment about one-third longer than fourth, second and third together as long as fourth, second twice as long as third.

Measurements. (Type) Length 12.0 mm.; width 5.0 mm.

Holotype.—Male, a unique Yosemite National Park, May, 1923. (J. B. Gladstone). [Author's collection, Cal. Acad. Sci., no. 3950].

The type was kindly given to the author by Prof. Vasco M. Tanner, Brigham Young University, Provo, Utah.

Stibia tortugensis new species

Tortugensis is one of the larger, if not the stoutest species, the prothorax is both relatively and comparatively larger than in any of the other species, the elytra appears to be rather more depressed also; the body luster is dull and alutaceous and the punctures of the apical declivity of the elytra are scattered and in greater part obsolete; the apical submarginal area is distinctly but not densely punctulate; the tenth antennal segment is triangular and as long as wide, the ninth subtriangular and longer than wide; the abdominal punctures are larger and sharply defined.

In *sparsa, imperialis* and *tanneri* the body surface is smooth and shining, the apical declivity of the elytra is more or less noticeably alutaceous and the punctures are nearly obsolete, the few present are widely scattered and minute; the apical submarginal impressed area is not distinctly punctulate. In *imperialis* the head and pronotum are much more sparsely punctate, and the punctures are much smaller. In *tanneri* the apical pronotal angles are larger than in any other of the known species, prominent and everted, as well as reflexed by the comparatively strong lateral beading of the apex; the apical submarginal area is not impressed across the suture; the head is relatively larger and the prothorax both relatively and comparatively smaller than in *tortugensis.*

In both *imperialis* and *tortugensis* the apical pronotal angles are small and not at all prominent. In both *tanneri* and *imperialis* the tenth antennal segment is longer than wide.

Form subfusiform-ovate, two and one-third times as long as wide; a stouter species with head and pronotum comparatively large. Color dull black, mouth-parts, antennae and legs rufo-piceous, tarsi more or less rufous. Luster feebly shining and more or less alutaceous. Pubescence extremely minute throughout.

Head about one-half wider than long, slightly widest across the eyes (Pl. V, fig. 27.); sides quite evenly arcuate and convergent to the position of the cicatrices of the oblique sutures, or less so with the angles more evident but well rounded and then moderately convergent; epistomal lobe well deflexed, triangular, with margins finely and irregularly serrulate, ridge narrow and rather prominent. Frons slightly convex anteriorly, more strongly so toward vertex, very broadly impressed anteriorly, more strongly laterally within the moderately convex supra-antennal convexities, the latter rather strongly declivous against the eyes; supraciliary carina rather well marked, curving arcuately over the eyes from the tempora and anteriorly bounding the preocular impressions internally; surface coarsely and densely punctate, with small impunctate areas on vertex, punctures for the most part discrete, separated by a distance less than their diameters, centrally and on vertex a little more widely and irregularly spaced; laterally there is some tendency for the punctures to form short linear series, and small on the sides, epistomal ridge and lobe. Eyes irregularly oval (Pl. V, fig. 13.), with the vertical diameter one-half greater than the horizontal. Antennae long and slender (Pl. V, fig. 11.), extending about three segments beyond the pronotal base, apical three segments slightly wider; segments two to eight inclusive elongate and cylindrico-obconical, second, sixth, seventh and eighth equal in length; second a little stouter and twice as long as wide, third about as long as ninth and tenth together and three and one-half times as long as wide; fourth and fifth equal in length and three times as long as wide; segments sixth, seventh and eighth two and one-half times as long as wide; ninth subtriangular and a little longer than wide, tenth triangular and a little wider than ninth, eleventh obovate and one-half longer than wide and quite as wide as tenth.

Pronotum one-half wider than long (Pl. V, fig. 28.); apex truncato-emarginate, about one-third wider than the head, margin feebly beaded laterally, angles distinct, subrectangular, not at all prominent or everted; sides broadly and evenly arcuate, slightly sinuate at times behind the angles anteriorly, not in the least so posteriorly, lateral margins distinctly obtuse and rounded except for a short distance behind the apical angles; base equal to the apex, broadly arcuate in middle third, thence broadly and feebly sinuate to the distinct and obtuse angles, bead coarse and moderately flat and sparsely punctulate. Disk strongly convex centrally and arcuately declivous toward the angles; punctation moderately coarse, discrete, less dense centrally and somewhat irregular, denser laterally with a tendency to form short series, but the punctures are not noticeably coalescent and there separated by a distance less than their diameters; lateral submarginal areas concave and shallow, distinct in middle three-fifths, less so posteriorly, finely punctate and not glabrous.

Propleurae smooth and finely to more or less obsoletely punctate. Hypopleural punctures large, shallow and more or less oval, somewhat open anteriorly but not lunate, intervals not convex; procoxal convexities impunctate and slightly rugose. Prosternal punctures large, round, rather deep and well separated.

Elytra oval, about one-half longer than wide, widest at middle or slightly behind the same, at least three times as long as the pronotum; base quite transverse, marginal bead moderate and irregular as usual, scutellum transverse and in line with the bead, humeri obtuse beneath the basal pronotal angles; sides broadly and evenly arcuate, converging in apical fourth to the obtusely ogival apex, which is slightly emarginate at the suture. Disk more or less moderately convex in the central area, noticeably declivous at the humeri, strongly convex and declivous laterally, moderately inflexed, apical declivity obliquely arcuate to the apical submarginal and rather horizontal, feebly impressed area which does not extend across the suture, this area is distinctly, sparsely and irregularly punctate, punctures small, apical margin not reflexed; strial punctures moderate, slightly and individually impressed, especially laterally, separated by a distance equal to two or three times their diameters, becoming gradually smaller in posterior third and more or less obsolete on the declivity; internals slightly convex laterally, sparsely and distinctly punctulate, obsolete apically; scutellar series more or less regular, the punctures somewhat smaller.

Sternal and parasternal punctures large, round, deep and irregularly spaced; epimera impunctate.

Abdomen moderately convex, punctures small laterally and on segments three and four, larger on second in middle third, much coarser on first segment, intermediate in size and denser on fifth segment. First segment on median line about a third longer than the second, the latter about one-third longer than the third which is twice as long as fourth and equal to fifth. Legs moderate in length and slenderness. Metafemora a little longer than their tibiae. Metatarsi two-thirds as long as their tibiae; first segment quite equal to the combined lengths of second and third, and one-third longer than fourth, the latter twice as long as third, the second one-half longer than the latter.

Male. Usually rather less convex and variable in size. Pubescent fovea of first abdominal segment moderate and rather narrowly oval and across the post-coxal line, the hair somewhat coarse.

Female. Usually more convex to somewhat inflated. Median process of the last abdominal tergite (Pl. V, fig. 15.), subconical, sides feebly convergent to the well rounded apex, a little longer than wide at base, projecting about one-third of its length beyond the apices of the lateral lobes, the latter subangulate at apex, the sinuses rather broadly rounded at bottom.

Measurements.—(Types) Length 11 to 12 mm.; width 5 to 5 mm.

Holotype.—Female; Tortuga Island, Gulf of California, June 22, 1921. (E. P. Van Duzee), [Cal. Acad. Sci., no. 3951.] *Allotype.*—Male; same data, May 11, (J. C. Chamberlin), [Cal. Acad. Sci., no. 3952].

One *paratype,* male; Isla Partida, Gulf of California, July 2, 1921, (E. P. Van Duzee), [Cal. Acad. Sci.]

These are the specimens that were referred to as of doubtful status under the original description of *Stibia sparsa* Blais.[12]

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[12] Proc. Calif. Acad. Sci., (4), XII, p. 237, July 10, 1923. Later studies have convinced me that they should have specific standing.

EXPLANATION OF PLATES

PLATE III

Fig. 1.—Frontal view of head of *Orthostibia frontalis* Blais., male: I, middle or epistomal lobe; J, lateral lobe of Horn.

Fig. 2.—Front view of head of *Trimytis pruinosa* Lec., female: K, lateral lobe; L, epistomal lobe.

Fig. 3.—Front view of head of *Pescennius villosa* Champ. Mexico.

Fig. 4.—Front view of head of *Triphalopsis partida* Blais., female.

Fig. 5.—Front view of head of *Triorophus rugiceps* Lec.; A, dorsal tooth at base of mandible (Horn); B, porrect tooth.

Fig. 6.—Front view of head of *Triphalus perforatus* Lec.

Fig. 7.—Front view of head of *Stibia cribrata* Blais., female.

Fig. 8.—Front view of head of *Stibia sparsa* Blais., female.

Fig. 9.—Frontal view of mouth-parts of *Stibia imperialis* new species.

Fig. 10.—Mentum and maxillary palpi of *Stibia imperialis* new species.

Fig. 11.—Distinguishing characters of the Subfamily Tentyriinae: Mesocoxae entirely inclosed by the sterna and without trochantin: A, mesepisternum: B, mesepimeron; C, metepisternum; D, mesosternum; E, coxal cavity; F, metasternum.

Fig. 12.—Cross section of prothorax at middle, *Stibia imperialis* new species: F, obtusely rounded lateral pronotal margin.

Fig. 13.—Section of prothorax of *Stibia tuckeri* Casey.

Fig. 14.—Section of prothorax of *Stibia fallaciosa* new species, female: (*Stibia puncticollis* Blais. nec Horn.) G, sharp and narrowly reflexed lateral pronotal margin.

Fig. 15.—Section of prothorax of *Stibia cribrata* Blais.: H, sharp lateral pronotal margin.

Fig. 16.—Epistomal lobe of *Stibia fallaciosa* new species, showing serrulate margin.

Plate IV

Fig. 1.—Frontal view of head of *Stibia puncticollis* Horn, showing some details of sculpturing, female: A, frontal angle. (Syn. *Stibia hannai* Blais.) Higher magnification.

Fig. 2.—Frontal view of head of *Stibia granulata* Blais., female.

Fig. 3.—Pronotum of *Stibia puncticollis* Horn, female.

Fig. 4.—Pronotum of *Stibia sparsa* Blais, male.

Fig. 5.—Pronotum of *Stibia sparsa*, female.

Fig. 6.—Pronotum of *Stibia tuckeri* Casey, male.

Fig. 7.—Pronotum of *Stibia fallaciosa* new species, female. Loreta, Lower California. (*Stibia puncticollis* Blais. nec Horn.)

Fig. 8.—Pronotum of *Stibia cribrata* Blais., male.

Fig. 9.—Pronotum of *Stibia blairi* new species.

Fig. 10.—Pronotum of *Stibia granulata* Blais.

Fig. 11.—Pronotum of *Stibia tanneri* new species, female.

Fig. 12.—Pronotum of *Stibia imperialis* new species, female.

Fig. 13.—Outline of body *Stibia sparsa* Blais., female, as viewed from behind.

Fig. 14.—Pronotum of *Stibia williamsi* Blais., female.

Fig. 15.—Frontal view of head of *Stibia blairi* new species.

Fig. 16.—Head of *Stibia tanneri* new species, female.

Fig. 17.—Head of *Stibia imperialis* new species, female.

Fig. 18.—Head of *Stibia tuckeri* Casey, male.

Fig. 19.—Head of *Stibia fallaciosa* new species, female.

Fig. 20.—Head of *Stibia williamsi* Blais., female.

Fig. 21.—Head of *Stibia granulata* Blais., female.

Fig. 22.—Apex of last abdominal tergite of *Stibia imperialis* new species, female. Papago Wells, Arizona.

Fig. 23.—Last tergite of *Stibia williamsi* Blais., female.

Plate V

Fig. 1.—Aedeagus of *Stibia williamsi* Blais., male, ventral view. In repose the organ is in reversed position to what it is in the Eleodiini. A, apicale (united coxites of Tanner); B, basale (valvifer of Tanner).

Fig. 2.—Aedeagus. Dorsal view, showing middle lobe as it appears in the superior position: C, widely open genital fissure; D, middle lobe of Sharp and Muir; E, inflexed sides of apicale.

Fig. 3.—Aedeagus. Lateral view: F, middle lobe; G, apicale; H, basale.

Fig. 4.—Aedeaga of *Stibia williamsi* Blais., female. Dorsal view of genital segment partly covered by anal canal and proctiger: L, dorsal plate of valve; M, proctiger.

Fig. 5.—Aedeaga. Ventral view: N, ventral plate of valve (apical sclerite); O, basal sclerite of valve.

Fig. 6.—Aedeaga. Lateral view.

Fig. 7.—Right antenna of *Stibia williamsi* Blais., female.

Fig. 8.—Antenna of *Stibia tanneri* new species, male.

Fig. 9.—Antenna of *Stibia imperialis* new species, female.

Fig. 10.—Antenna of *Stibia tuckeri* Casey, male.

Fig. 11.—Antenna of *Stibia tortugensis* new species, female.

Fig. 12.—Right eye of *Stibia sparsa* Blais., male, showing two degrees magnification.

Fig. 13.—Right eye of *Stibia tortugensis* new species, female.

Fig. 14.—Last abdominal tergite, showing apical sinuations and median process of *Stibia fallaciosa* new species, female type.

Fig. 15.—Last tergite of *Stibia tortugensis* new species, female.

Fig. 16.—Last tergite of *Stibia puncticollis* Horn, female. Angulo Rock, Asuncion Island, Lower California.

Fig. 17.—Last tergite of *Stibia tanneri* new species, female. Yosemite National Park, California.

Fig. 18.—Last tergite of *Stibia sparsa* Blais., female.

Fig. 19.—Last tergite of *Stibia blairi* new species, female.

Fig. 20.—Mandibles of *Stibia imperialis* new species; A.—Right, showing apical cusps; I, porrect tooth; J, emargination beneath tooth and which receives lateral margin of labrum when in adduction. B.—Left, showing apical cusps and truncate porrect tooth, K.

Fig. 21.—Left antenna of *Stibia sparsa* Blais., female.

Fig. 22.—Left antenna of *Stibia puncticollis* Horn, male.

Fig. 23.—Right antenna of *Stibia granulata* Blais., female.

Fig. 24.—Right antenna of *Stibia fallaciosa* new species, female.

Fig. 25.—Right antenna of *Stibia cribrata* Blais., female.

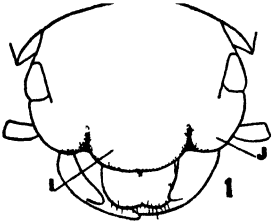
Fig. 26.—Right antenna of *Stibia blairi* new species, female.

Fig. 27.—Frontal view of head of *Stibia tortugensis* new species, female.

Fig. 28.—Pronotum of *Stibia tortugensis* new species, female.

Fig. 29.—Intercoxal process of first abdominal segment of *Stibia puncticollis* Horn, male. Hairs a soft pile.

Fig. 30.—Intercoxal process of first abdominal segment of *Stibia sparsa* Blais., male. Fovea narrower oval and the hair coarser.



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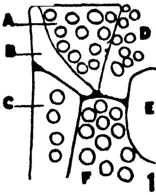

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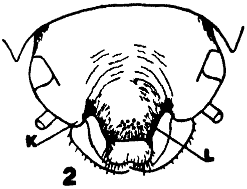

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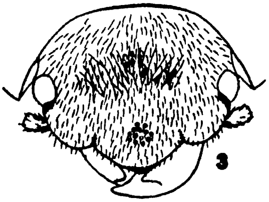

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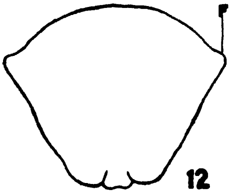

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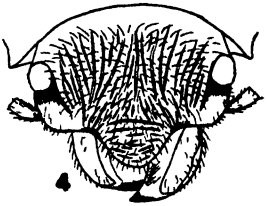

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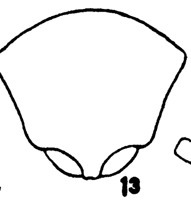

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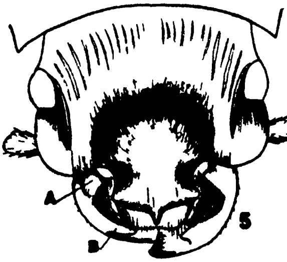

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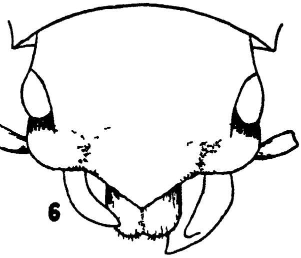

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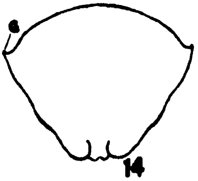

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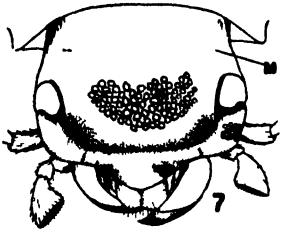

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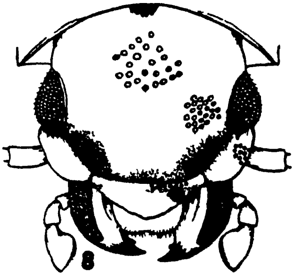

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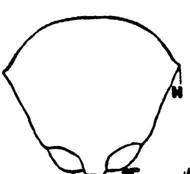

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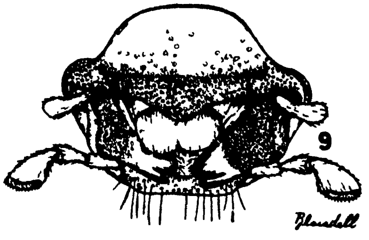

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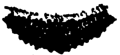

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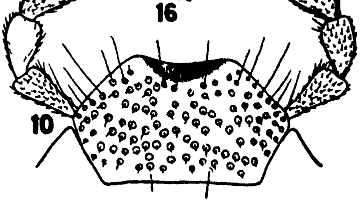

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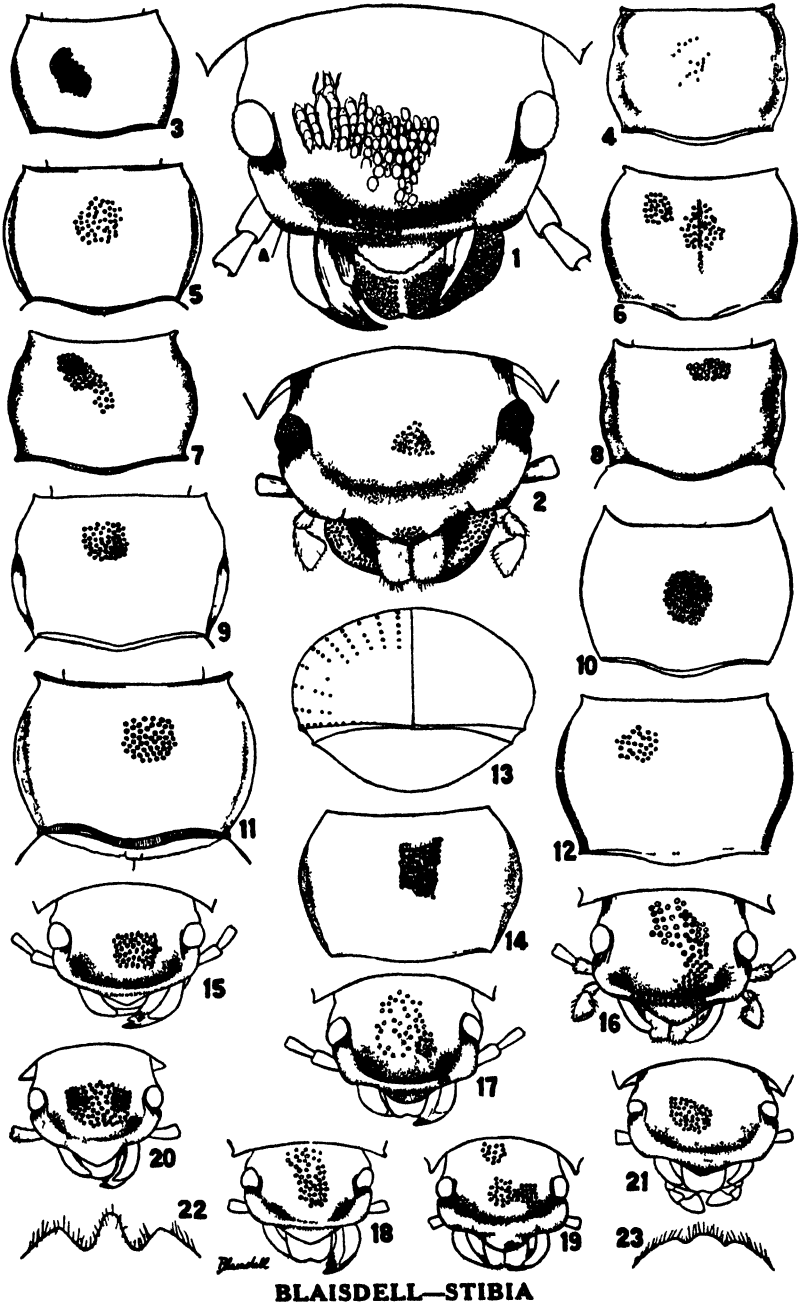
BLAISDELL—STIBIA



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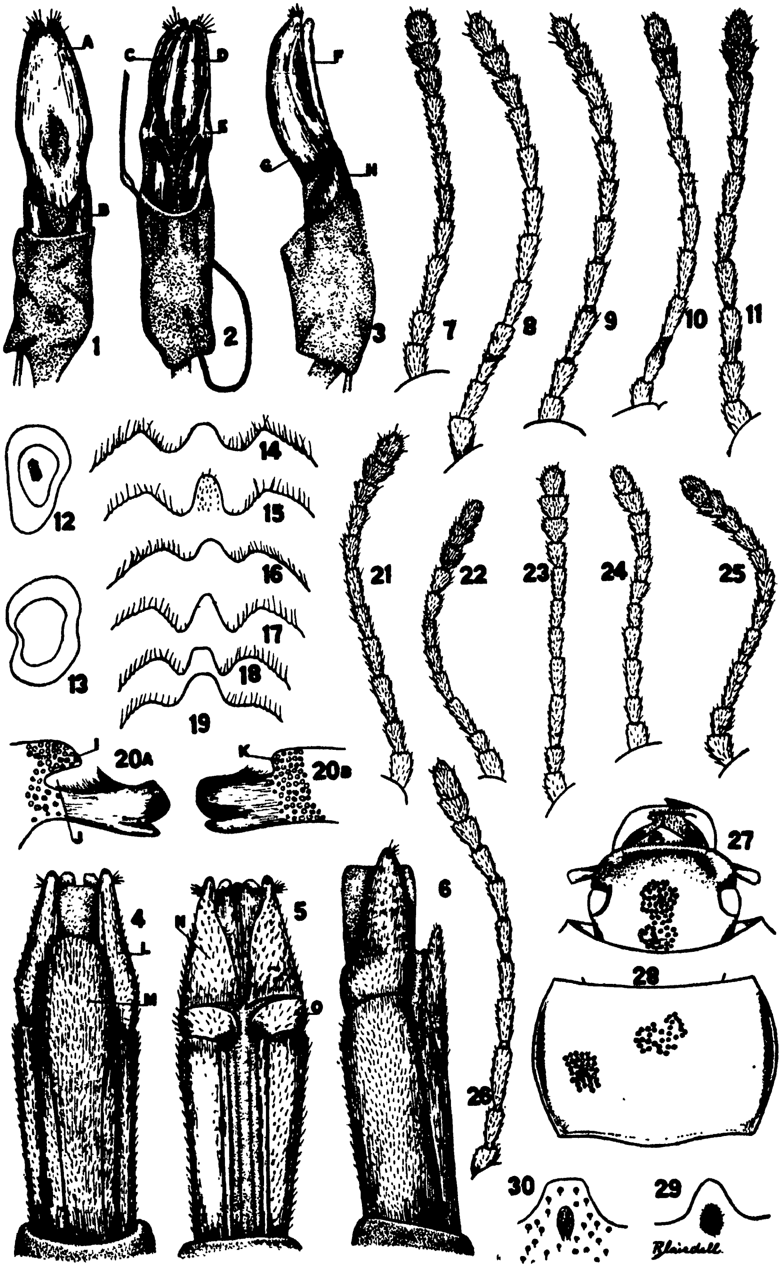

BLAISDELL—STIBIA

THE NYMPHS OF NORTH AMERICAN LIBELLULINE DRAGONFLIES

(ODONATA)

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(Plates VI and VII)

Since the publication of the " Handbook of North American Dragonflies " in 1929,[1] the then unknown nymphs of a number of regional genera of Libellulinae have been discovered. A very substantial contribution to knowledge of them was made by Elsie Broughton Klots in her " Dragonflies of Puerto Rico and the West Indies ",[2] wherein the nymphs of *Lepthemis, Miathyria, Scapanea, Macrothemis, Micrathyria,* and *Dythemis* were made known. In the following pages the nymphs of five additional genera will be described and illustrated. These are *Ephidatia, Tauriphila, Macrodiplax, Cannacria* and *Brechmorhoga.*

The new material has come from various sources. Mr. H. K. Townes, Jr. found *Cannacria gravida* transforming on the shore of Lake Marie in the coastal plain of South Carolina. Adults were very common in flight and exuviae were common on the emergent stems of sedges and weeds. Our figure is of one of these cast skins.

A duck found and ate the nymph that we are referring by exclusion to *Macrodiplax balteata.* The U. S. Bureau of Biological Survey got the duck in Florida and extracted the nymph from its stomach. Dr. McAtee sent it to us for determination. The only known Florida dragonfly to which this nymph can be referred (nymphs of all the other genera being known) is Macrodiplax.

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[1] Needham and Heywood, C. C. Thomas, Springfield, Ill., 378 pp.

[2] N. Y. Acad. Sci., Surv. Porto Rico, xiv, 1-107, 7 pls.

Dr. Myron Gordon, while gathering tropical fishes in Mexico, caught the nymphs that we are referring to the genus *Tauriphila*. The specimens were well preserved and the venation of the developing wings served as a basis for this reference.

The senior author collected and reared nymphs of *Ephidatia cubensis* in Lake Tortuguera, Puerto Rico, in February and March 1935. The genus was previously unrecorded for the Puerto Rican fauna. The nymph of *Brechmorhoga*, also, now described for the first time, was collected by the senior author years ago in southern California.

We now present descriptions and figures of these hitherto unknown nymphs and follow them with a new key, including in it the known nymphs of West Indian and Mexican genera. We follow the key with a verification table, which will enable the user of the key to quickly learn whether it has led him aright. In our experience we have found that this combination of key and table greatly facilitates determinations.

I. DESCRIPTIONS

1. **Ephidatia cubensis** (Scudder) (Pl VI, fig. 1; pl. VII, fig. 5.)

Length 20, hind femur 6.5, hind tibia 7.5, abdomen 12; width of head 6, of abdomen 7 millimetres.

This is a slender, long-legged nymph with long abdominal spines. Head flattened and smooth above, widest across the rear of the eyes, the straightish hind margin beset with small spinules. Antennae 7-jointed, the first, second and the seventh, shorter than the others. The hinge of the labium reaches backward between the bases of the middle legs. Lateral setae 6; mental setae 9 to 11, teeth rather deeply cut and serrate, each armed with two very unequal spinules.

Prothorax with a wide arcuate rear border whose laterally projecting ends are copiously fringed with hairs. Legs slender, thinly hairy. Femora pale, with touches of brown at the ends and with two brown rings in between. Wing cases reach the middle of the sixth abdominal segment.

Abdomen triquetral, with long, thin, sharp dorsal hooks, lateral spines and appendages. The dorsal hooks are present on segments three to nine. They are thin, laterally flattened and backwardly directed. They are largest on segments seven and eight, small and more erect on three and four. The lateral spines of eight are somewhat shorter, those of nine somewhat longer than the middorsal length of nine. The appendages are very long and slender, longer than thrice the middorsal length of nine, stout at base but attenuate beyond their basal third, and armed with scattering spines.

The species was common at Lake Tortuguero, Porto Rico, where in February and March 1935, nymphs and cast skins were collected, others taken in transformation, and where on February 15, others were reared in cages.

2. **Tauriphila** sp.? (Pl. VI, fig. 2; pl. VII, fig. 6.)

Length 19, hind femur 6, abdomen 12; width of head 5.5, of abdomen 7 millimetres.

This is a stocky nymph with wide abdomen. Head widest across the middle of the eyes, contracted behind them to the bulging hind angles, between which is a wide shallow concavity of the occipital border. A transverse band of brown extends across the head between the eyes, with paler areas before and behind it, and there are some small brown markings farther forward between the bases of the antennae. The antennae are 7-jointed, with the basal joint shorter and the third joint longer than the others. The hinge of the ample labium reaches backward almost to the base of the hind legs. Lateral setae 8; mental setae 9-10; spinules on teeth 3-4.

The legs are rather slender and nearly bare. The femora are thrice ringed with brown, the intermediate ring wider than the others, and the apical ring faint.

Abdomen oval, depressed, its upper surface both clouded and nottled with brown on each segment. Dorsal hooks on segments three to nine, laterally flattened and posteriorly directed, largest on seven and eight. Lateral spines sharp and thornlike on eight and nine alike and about equalling in length the middorsal length of the ninth segment. Segment ten short, annular, almost included in the apex of nine. Abdominal appendages short, the superior and inferiors of equal length, the laterals a little shorter than the others.

Described from a nymph apparently in the penultimate instar, collected by Dr. Myron Gordon in the Rio Aztla, San Luis Potosi, Mexico, on April 20, 1932. Another nymph still more immature was taken with this one.

3. **Macrodiplax balteata** (Hagen) supposition
(Pl. VII, fig. 3; pl. VI, 7.)

Length 14, abdomen 8, hind femur 4.5; width of head 5, of abdomen 6 millimetres.

This is a rather stocky, smooth bodied nymph with long, incurving lateral spines terminating the abdomen. The head is more than twice as wide as long. It is suddenly contracted at the rear of the eyes and then broadly rounded to the straightish occipital margin. The rear of the head is beset with spinules some of which are arranged in vertical bands. Eyes very broad, obtusely projecting at posterior margin. Labium broad, its median lobe beset with minute marginal prickles behind which is a thin line of spinules; adjacent margin of lateral lobes similar. Lateral setae 10. Mental setae 15 or 16 each side, the innermost very small, the 4th and 5th counting from the outside, largest. Hook slender, incurving its entire length. Teeth about 8, low, crenulate, a little askew to the inner side, each armed with three or four graduated spinules.

Legs rather short, the carinae of the curved femora and the straight tibiae bear rows of prickles intermixed with hairs that become longer to rearward. (Front legs lacking in this specimen). The wings (2 mm. long) indicate that this nymph is perhaps two-thirds grown.

Abdomen broadly oval, strongly depressed, widest on segment seven. Dorsal hooks are present on segments three to eight, short on three, increasing in size and in declination to rearward, subequal on six, seven and eight, the hook of eight overarching the whole length of the ninth segment. Lateral spines of eight nearly equalling the middorsal length of that segment and somewhat slightly incurved; those of nine nearly twice as long and strongly incurved. Segment ten annular and almost included in the apex of nine. Terminal appendages longer than segments nine and ten together, the superior attenuate to a long point, the laterals two-thirds as long.

The single specimen was an immature nymph, taken from the stomach of a duck (*Nyroca affinis*) near Wilson, Florida by the Bureau of Biological Survey of the U. S. Department of Agriculture (No. 167366). It was well digested, only the chitinous skeleton being preserved, and front legs were missing. After clearing in KHO the structural characters were easily seen, as our figure will show (fig. 3).

4. Cannacria

We retain this name, pending the rearing of nymphs of *Brachymesia furcata*. The nymphs attributed by supposition to that species by Doctor Klots are certainly not congeneric with those described below. But that supposition was probably incorrect as pointed out by Geijskes.[3] We suspect that her nymphs are of the genus *Orthemis*. Her figure does not show the crenulations of the front border of the median lobe of the labium, but her nymphs were immature, and we have ascertained that in young nymphs of *Orthemis* that border is nearly smooth. The full complement of lateral setae is also late in developing.

We are in doubt also as to whether the nymphs Geijskes attributed on venational evidence to *Brachymesia furcata* really belong to that species. They appear to be quite identical with nymphs recently obtained by us in Porto Rico. These should belong to *C. herbida,* for they are very like those of *C. gravida* described below. They were obtained where *C. herbida* was flying, and *B. furcata* was not found in Porto Rico. The single venational character on which Gijskes based his supposition is a variable one in *C. herbida.* The position of base of midrib of the anal loop—whether twice or thrice as far from the triangle as from the base of vein A_2—will not distinguish between *C. herbida* and *B. furcata.* In our specimens of the former species we have found it in both positions and in all intermediate ones. When the nymph of the latter is found it will probably confirm or confute the evidence presented by the senior author[4] as justifying their generic separation.

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[3] Internat. Rev. Hydrobiol., xxxi, 298, 1934.

Dr. Geijske's description and figure of the nymph[5] are very satisfactory for our Porto Rican specimens.

Cannacria gravida (Calvert) (Pl. VI, fig. 4; pl. VII, fig. 8.)

Length 25-27, abdomen 15, hind femur 7; width of head 6, of abdomen 8 millimetres.

This is a smooth nymph with long caudal spines. The prickly-pubescent body is prettily marked with a pattern of green and brown. Head widest across the middle of the eyes. Behind the eyes it is abruptly narrowed to the rounded scurfy-pubescent hind angles. The hind margin is slightly concave, and marked with vertical bare lines in the midst of the short pubescence. Antennae 7-jointed, the third joint much longer than the others, which are subequal. Labium thin, its hinge lies between the middle legs. Lateral setae 7, mentals 9 or 10, teeth well developed, strongly serrate, and armed each with two spinules.

Legs slender; femora twice ringed with brown There is also a faint subbasal ring on the tibiae. The wing sheaths reach backward to the sixth abdominal segment.

Abdomen elongate oval, little depressed. Dorsal hooks on segments three to nine all thin and sharp. In front they are short and erect; to rearward, progressively elongated and declined, until the tip of the hook on nine overpasses the apex of the tenth segment. Lateral spines on segments eight and nine slender, sharp, straight, somewhat longer on nine where they equal the middorsal length of that segment. Appendages very long and sharp, longer than segments nine and ten together, superior and inferiors of equal length, laterals less than half as long.

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[4] Ent. News, XLI, 254-255, 1930.

[5] Internat. Rev. Hydrobiol., XXXI, 299-302, 1934.

Described from several exuviae collected by Henry Townes, Jr. at Lake Marie, Horry County, South Carolina, on June 24, 1932, where adults of this species were flying in numbers. " Exuviae common on emergent sedges and weeds."

Geijske's nymphs from Aruba, supposed by him to be those of *Brachymesia furcata*, agree with ours from Cabo Rojo, Puerto Rico (which we believe to be those of *Cannacria herbida*) in having ten lateral setae and twelve to thirteen mentals on the labium, and more numerous spinules on the teeth of the opposed margins of the lateral lobes. Ours are larger, being fully developed, measuring 25 mm. in total length.

5. **Brechmorhoga mendax** (Hagen) (supposition)

Length 24, abdomen 15; width of head 7, of abdomen 8 millimetres.

This is a dark-colored, stout-bodied, short-legged nymph with rather heavily chitinized and nearly bare skin. Head twice as wide as long, strongly narrowed behind the eyes, where armed with prickles on the sloping margins. Occipital margin truncate. Eyes large, broadly rounded and very prominent. Antennae short, 7-jointed, the second joint almost as long as the entire flagellum. Labium broad, its hinge reaching the middle legs. Lateral setae eight or nine, mentals fourteen or fifteen. Teeth large, deeply incised, obtuse, the middle ones armed each with three or four graduated spinules. Hook hardly longer than the lateral setae, but stout.

Legs faintly banded with brown, and longitudinally carinate, with prickles along the carinae, and bare strips in the valleys between them. Tips of the wing sheaths reach the sixth abdominal segment.

Abdomen ovate, depressed, widest on segment six, most narrowed to rearward on nine. Segment ten well exserted, more than half as long as nine. Color brownish, with a pattern of large squarish, scar-like, darker brown marks along each side, accompanied by some lesser dots. Dorsal hooks present on segments two to nine, all broad, and blunt-tipped, erect on segment two, becoming lower and broader to rearward. Lateral spines on eight and nine short, sharp, triangular, about equal in size, and hardly more than half the middorsal length of segment nine. Appendages stout, triangular, less than the length of nine and ten together, the laterals about half as long as the others.

Described from a fully grown nymph collected by the senior author in San Dimas Canon, California, on the 23rd of April, 1923.

This nymph is similar in size and in general appearance to that of *Paltothemis lineatipes* Karsch,[6] having the same sort of stocky body, bulging eyes, and thick scurfy skin, but the difference in development of dorsal hooks on the abdomen will readily separate the two. The heavily scleritized wing sheaths also show a differential character in that the radial planate subtends two cell rows in *Paltothemis* and only one in *Brechmorhoga.*

II. AIDS TO DETERMINATION

1. A Key to the Genera

1. Eyes capping the very prominent antero-lateral angles of the head; abdomen elongate 2
   Eyes lower, more broadly rounded and more lateral in position 5
2. Margin of median lobe of labium smooth ....*Libellula*
   Margin of median lobe of labium crenulate 3
3. No dorsal hooks on middle abdominal segments ....*Orthemis*
   With dorsal hooks on middle abdominal segments 4
4. No dorsal hook on segment 8 ....*Plathemis*
   With a dorsal hook on segment 8 ....*Ladona*
5. Inferior abdominal appendages strongly decurved 6
   Inferior abdominal appendages straight or nearly so 7
6. No lateral spines on abdomen; lateral setae 7 to 9 ....*Erythemis*
   A minute lateral spine on 9; lateral setae 11 or 12 ....*Lepthemis*
7. With dorsal hooks on some of the abdominal segments 8
   With no dorsal hooks on any of the abdominal segments 21
8. With a dorsal hook on the 9th segment 9
   With no dorsal hook on the 9th segment 18
9. Dorsal hooks cultriform, the series in lateral view like the teeth of a circular saw ....*Perithemis*
   Dorsal hooks more spine-like or low and blunt 10
10. Dorsal hooks long and laterally flattened 11
    Dorsal hooks short and thick 14
11. Abdomen broadly depressed, little longer than wide ....*Tauriphila*
    Abdomen about twice as long as wide 12
12. Lateral spines of 9 longer than mid dorsal length of 9 13
    Lateral spines of 9 not longer than mid dorsal length of 9 ..*Cannacria*
13. Lateral setae 6; size small (18 mm.) ....*Ephidatia*
    Lateral setae 8; size larger (21 mm.) ....*Miathyria*

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[6] Needham, Proc. U.S. Nat. Mus., XXVII, 699, pl. 39, fig. 4.

14. Teeth on lateral lobe of the labium large 15
Teeth on lateral lobe of the labium obsolete ....*Dythemis*
15. Lateral setae 6 ....*Macrothemis*
Lateral setae 7-9 16
16. Lateral spines long and strongly incurved ....*Macrodiplax*
Lateral spines not strongly incurved 17
17. Dorsal hooks high and conspicuous ....*Brechmorhaga*
Dorsal hooks low; ridge-like ....*Scapanea*
18. Dorsal hook present on 8 ....*Sympetrum*[7]
No dorsal hook on 8 19
19. Lateral spines of 9 much longer than 9 mid-dorsally ....*Celithemis*
Lateral spines of 9 not longer than 9 mid-dorsally 20
20. Teeth on lateral lobe of labium obsolete ....*Leucorrhinia*
Teeth on lateral lobe of labium conspicuous ....*Paltothemis*
21. Lateral spines of 9 not longer than 9 mid-dorsally 22
Lateral spines of 9 much longer than 9 mid-dorsally 26
22. Diminutive (10 mm. long); lateral setae 6; end of abdomen truncated and very hairy ....*Nannothemis*
Larger (12 to 18 mm.); lateral setae more than 6 23
23. Lateral spines of 8 very minute or wanting ....*Tarnetrum*[8]
Lateral spines at least half as long as those of 9 24
24. Mainly northern North America, superior abdominal appendages longer than the inferiors ....*Leucorrhinia*
Mainly southern North America, superior abdominal appendages shorter than the inferiors .... .25
25. Lateral spines of 8 half as long as 9 middorsally ....*Erythrodiplax*
Lateral spines of 8 nearly as long as 9 mid-dorsally ....*Micrathyria*
26. Lateral spines of 8 about half as long as those of 9 ......*Pachydiplax*
Lateral spines of 8 nearly as long as those of 9 27
27. Superior abdominal appendage longer than the inferiors ......*Pantala*
Superior abdominal appendage shorter than the inferiors .....*Tramea*

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[7] Occasionally absent in *S. danae.*

[8] Under this name we separate two species that have long stood as a discordant element among the species of Sympetrum, *S. illotum* and *S. corruptum.* They stand apart by well known characters of both adult and nympth and by their southward distribution. The nymphal distinctive characters shown in the accompanying table are not greater than are those of the adult. We designate *S. illotum* to be the type of the genus.

2. Verification Table

Name of genus	Length when full grown	Dorsal hooks on abdomen	Lateral spines on segment 8 (10)	Lateral spines on segment 9 (10)	Lateral abdominal appendages	Superior abdominal appendages	Inferior abdominal appendages (11)	Size of labial teeth (14)	Labial spinules (12)	Mental raptorial setae of labium (13)	Lateral raptorial setae of labium
Brechmorhoga	24	2-9	5	5	6	10	10	high	2, 3, 4	14-15	8, 9
Cannacria	18-27	3-9, 10	8	8-9	4	9	10	low	2, 3	8-11	6, 10
Celithemis	15-21	4-7	6-12	18-20	5	8	10	obs.	2, 3, 4	11-12	7, 8
Dythemis	17	3-9	5	7	8	10	10	obs.	3, 4	9	6, 7
Ephidatia	17-20	3-9	9	12	4	10	10	high	2	9-11	6
Erythemis	17	0	0	0	6	10	10	0	3	11-12	7, 8, 9
Erythrodiplax	12-18	0	5	6	6	8	10	obs.	2, 3	10-14	8, 11
Ladona	20-24	4-8	6	5	4	10	10	obs.	1	0-3	6
Lepthemis	18	0	0	2	6	10	10	0	2	11-12	11, 12
Leucorrhinia	17-18	3-8 or 0	2-5	3-10	6	10	10	obs.	1, 2, 3	13-15	10, 11
Libellula	20-27	3-8 or 0	6	6	4	10	10	low	2, 3	12-13	5-11
Macrodiplax	14	3-8	10	14	4	10	10	low	3	16-17	10
Macrothemis	14	3-9	2	2	3	10	10	high	3	9-10	6
Miathyria	21	2-9	7	12	4	9	10	mod.	2	7-9	8
Micrathyria	16	0	8	9	5	8	10	low	1, 2	11-13	10, 11
Nannothemis	10	0	6	7	8	10	10	obs.	2, 3	9-11	6
Orthemis	22	0	5	6	4	10	10	high	2	3-4	9
Pachydiplax	21	0	6	12	4	6	10	low	3, 4	10-13	10
Paltothemis	23	2-6	5	7	6	10	10	high	3, 4	11-13	9
Pantala	26-28	0	11	14	8	12	10	high	3, 4	16-18	14, 15
Perithemis	15	3-9	6	6	7	10	10	high	2, 3	9-10	5
Plathemis	25	3-6	4	5	6	10	10	high	2, 3	10-11	8
Scapanea	22	2-9	4	5	5	10	10	high	3, 4	9-10	7-9
Sympetrum	13-18	4, 6-7, 8	3-9	3-12	4-6	7, 8	10	low	2	12-18	9-12
Tarnetrum	18-21	0	0, 1	1, 6	5, 7	9	10	0	1, 3	12-16	9, 10-16
Tauriphila	16-19	3-9	8	9	5	10	10	mod.	3, 4	9-10	8
Tramea	24-27	0	12	12	8	8	10	low	4, 5	13-15	10-11

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[10] Length as compared with mid-dorsal length of the 9th segment taken as 10.

[11] Length of inferior appendage taken as 10.

[12] Number on middle teeth.

[13] Number on one side only, and in two groups as to size.

[14] Abbreviations: *obs.*, obsolete; *mod.*, moderate; *0*, wanting or absent.

Addendum.—Since this paper was completed a description of the nymph of *Cannacria* (*Brachymesia*) *gravida* with figures has been published by Dr. C. Francis Byers in *Entomological News*, XLVII, pp. 35-36, 1936; also a key to the genera of the known nymphs of American Libellulidae (*l.c.* pp. 60–64), made to include this nymph. In that key certain genera are indicated as known only by supposition; but the present state of our knowledge is much better than thus indicated. In March 1935 the senior author reared in Porto Rico, *Macrothemis celeno, Scapanea frontalis* and *Dythemis rufinervis*, confirming Dr. Elsie B. Klots' determinations that were made from the nymphal venation. In 1930 he collected a nymph of *Miathyria* in the botanic garden at Georgetown, British Guiana, and determined it to that genus by its very distinctive venation.

EXPLANATION OF PLATES

PLATE VI

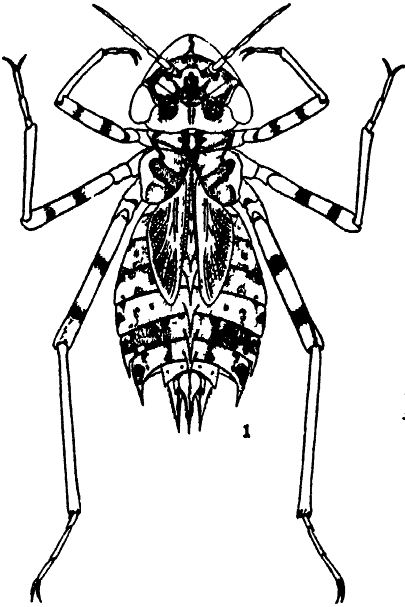
Libelluline Nymphs

Fig. 1.—*Ephidatia cubensis.*
Fig. 2.—*Tauriphila* sp.
Fig. 3.—*Macrodiplax balteata.*
Fig. 4.—*Cannacria gravida.*

PLATE VII

Labia of Libelluline Nymphs

Fig. 5.—*Ephidatia cubensis.*
Fig. 6.—*Tauriphila* sp.
Fig. 7.—*Macrodiplax balteata.*
Fig. 8.—*Cannacria gravida.*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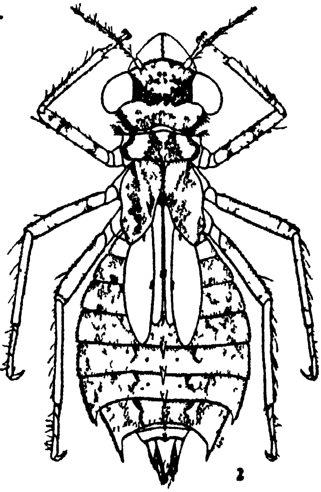
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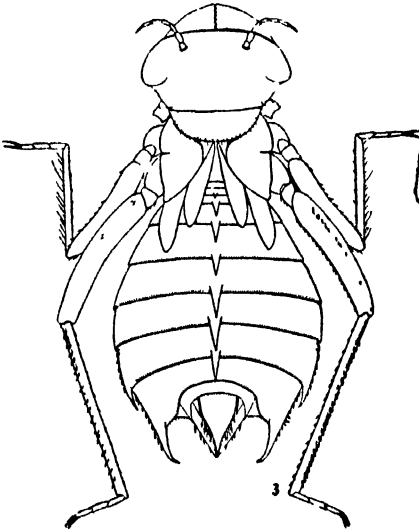
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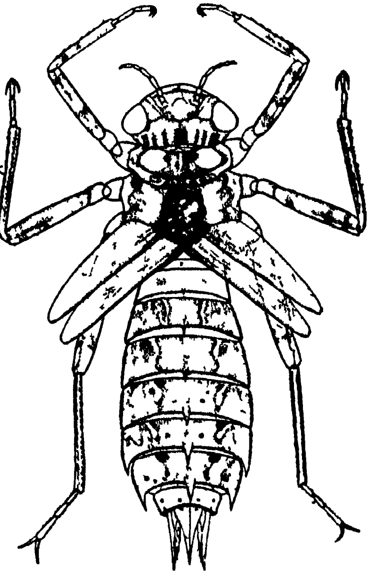

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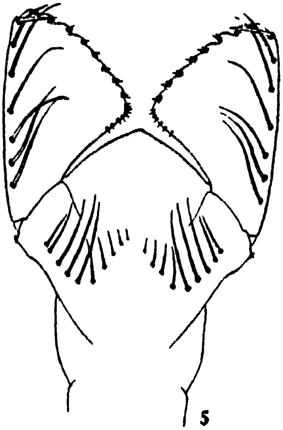

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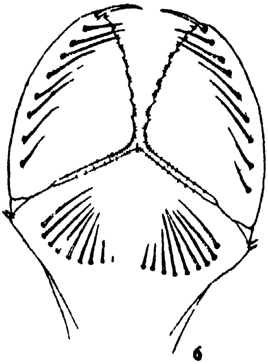

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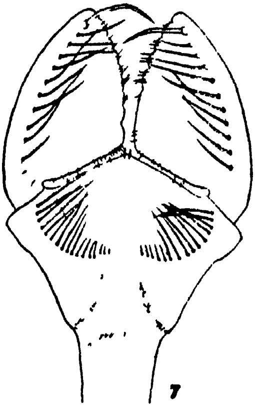

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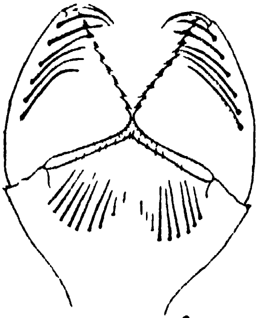

8

A REVISION OF THE GENUS MEGACHILE IN THE NEARCTIC REGION [1]

PART IV [2]

TAXONOMY OF SUBGENERA XANTHOSARUS, PHAENOSARUS, MEGACHILOIDES AND DEROTROPIS

(Hymenoptera: Megachilidae)

BY THEODORE B. MITCHELL

(Plates VIII-XI

Since the publication of Part I of this Revision [2] the accumulation of additional data and material has resulted in some modification of the classification of certain of the species which are included in this part.

With reference first to *Xanthosarus*, it is stated (p. 300) that it is one of the Holarctic groups, but a further study of the two presumed Palaearctic representatives, *maritima* and *lagopoda*, reveals that they are quite distinct from the species of this region. This is evident chiefly from a study of the genital armatures and hidden abdominal sterna and indicates that these two species are probably more closely allied to the species of *Delomegachile*. It remains to be seen whether or not *Xanthosarus* is limited to the Nearctic region. The range of *comata*, one of the included species, indicates a slight penetration at least of the Neotropical region.

The conception of the subgenus *Megachiloides* must be considerably modified from that given in Part I. It was originally erected to include a single species, *oenotherae*, and was considered at that time to be of generic rank, chiefly because of the extreme length of the tongue. The discovery of related forms, however, in which the joints of the labial palpi are more nearly equal in length indicated the probability that they are closely related to the species of *Xeromegachile*, and the group was reduced to subgeneric rank. Since then it has been discovered that a species recently described by Cockerell (see p. 164, *xerophila*) is closely related to some of the species assigned to *Megachiloides* but known only in the female sex (*anograe, astata, laurita,* etc.). Both sexes of *xerophila* are known, and while the female is readily recognizable as belonging to this group, because of the peculiar dentition of the mandible, the male is difficult to separate from the species of *Xeromegachile.*

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[1] Contribution from the Department of Zoology and Entomology, North Carolina State College, published with the approval of the Director of the North Carolina Experiment Station as Paper no. 85 of the Journal Series.

[2] Parts I, II and III. Trans. Am. Ent. Soc., LIX, pp. 295–361, (1934); LXI, pp. 1–44, (1935); LXI, pp. 155–205, (1935).

More recently Timberlake has discovered that *Xeromegachile pascoensis* (described also under the name *bakeri*) is the male of *astata*, one of the species assigned to *Megachiloides.* Moreover, there are two other species originally assigned to *Xeromegachile* which show evidence of kinship to *pascoensis* and must be separated from *Xeromegachile* with *pascoensis* in any reclassification of these species.

Thus it is evident that the subgenus *Megachiloides* as delimited in Part I (p 301) contains two quite definite groups of species. One of these constitutes the group s.str. and includes but three species, *amica, oenotherae* and *umatillensis*, while the others then assigned to the group must be recognized as forming with *xerophila* a new and quite distinct group. The name *Derotropis* is proposed for this group which includes the following species: *pascoensis* Mitchell and *xerophila* Cockerell, known in both sexes; *anograe* Cockerell, *subanograe, gabrielensis* and *laurita* Mitchell, known only in the female sex; and *gravita* and *alamosana* Mitchell, known only in the male sex.

Recognition of this new group of species renders the original key to subgeneric groups incomplete, and it becomes desirable therefore to redefine certain of these groups and to construct a new key to these closely related groups included in this fourth part of the Revision together with the group *Xeromegachile* which will be covered in Part V, yet to be published. This key will include all of the groups in which the males have an entire, more or less rounded carina on the disc of the sixth abdominal segment. It will include also *Xanthosarus*, the males of which have an emarginate carina, but in which the females are very similar to those in *Phaenosarus*. The key characters seem to be reasonably reliable except in the separation of the species of *Derotropis* and *Xeromegachile*. These are so difficult to separate that it will be desirable probably to include the species of *Derotropis* in the key to species of males of *Xeromegachile* in the fifth part of the Revision.

Key to Megachile Subgenera Related to Megachiloides

Females

1. Mandibles distinctly 5-dentate (see *agustini*, Pl. VIII) 2
   Mandibles either 3- or 4-dentate 3
2. Pubescence of sixth tergum erect nearly to tip, the sternum not protruding beyond the tip of the tergum which is short and broad, rounded apically ....*Xanthosarus* Robertson
   Pubescence of sixth tergum appressed over apical half, the sternum protruding slightly beyond the apex of the tergum which is rather long, the tip narrowly rounded ....*Phaenosarus* Mitchell
3. Mandibles 3-dentate, with two distinct apical teeth and a very long cutting edge to the inner angle (see *anograe*, Pl. VIII).
   Derotropis new subgenus
   (Type, *M. pascoensis* Mitchell)
   Mandibles distinctly or obscurely 4-dentate, without a long cutting edge as above 4
4. Tongue very long, second joint of labial palpus 1.7 to 4 times the length of the first; third mandibular tooth vestigeal, a short cutting edge between it and the inner angle (see *oenotherae*, Pl. VIII).
   Megachiloides Mitchell
   Tongue short, second joint of labial palpus only slightly longer than the first, if at all; mandible with four well defined teeth.
   Xeromegachile Mitchell

Males

1. Carina of sixth abdominal segment emarginate medially.
   Xanthosarus Robertson
   Carina of sixth segment entire 2
2. Fourth sternum with a small but distinct median tubercle on the apical margin; large robust species, the front metatarsi broadly dilated but only slightly excavated anteriorly ....*Phaenosarus* Mitchell
   Fourth sternum not tuberculate 3
3. Tongue very long, second joint of labial palpus 1.7 to 4 times the length of the second ....*Megachiloides* Mitchell
   Tongue not so long, second joint of labial palpus 1.5 times the length of the first, or less 4

4. Second joint of labial palpus at least slightly longer than the first; fifth presternite with a robust median spine-like projection directed toward the medasternite (see Pl. XI) ....*Derotropis* new subgenus
First and second joints of labial palpus subequal in length; fifth presternite usually lacking any spine-like median projection.
Xeromegachile Mitchell

Subgenus **XANTHOSARUS** Robertson

Xanthosarus Robertson, Trans. Am. Ent. Soc., XXIX, p. 172, 1903. Mitchell, Trans. Am. Ent. Soc., LIX, p. 300, 1934.

Tongue: Joints one and two of labial palpi subequal; maxillary palpi usually bare, with at most but very minute pubescence, third joint longer and more slender than the other two.

Female.—Mandible 5-dentate, the emargination between the third and fourth teeth much deeper than between the others, the fourth tooth narrow and oblique, a cutting edge between the third, fourth and fifth; basal joint of flagellum somewhat longer than either the pedicel or the second joint which are subequal; mid and hind metatarsi only slightly shorter and narrower than their tibiae; claws with robust basal setae which are tooth-like in appearance; abdomen cordate, the terga with shallow basal depressed areas, apical margins slightly depressed medially, more distinctly so laterally; sixth tergum more or less triangular with rounded apex, the sides at most but slightly concave in dorsal aspect, straight in profile and abundantly covered with erect pubescence; sixth sternum relatively bare apically, but without any evidence of a bare apical lip.

Male.—Mandible 3-dentate, the outer margin as seen from above quite evenly curved, not angulate, the inferior projection basal, relatively long and narrow, obliquely truncate; basal joint of flagellum subequal to or slightly longer than the pedicel, the second joint considerably longer, the apical one usually but very slightly dilated and flattened; inferior angle of cheek with a rounded carina-like protuberance which is bare and concave anteriorly, into which the inferior mandibular projection fits when the mandible is closed; front coxae bare anteriorly and without red bristles, with robust spines which are often triangularly pointed; front tarsi broadly dilated, the metatarsus deeply hollowed on anterior margin, the base nearly or quite as broadly dilated as the apex; mid femur much swollen and enlarged; mid metatarsus protuberant (except in *comata*); claws without basal teeth; carina of sixth tergum short and broad, with a small and sometimes indefinite median emargination, the apical margin of the tergum with relatively acute median teeth which are more distant from each other than from the lateral angles; seventh tergum relatively conspicuous, transverse, produced medially into a short triangular point.

Male sternites: Fourth sternum exposed; lateral portions of fifth presternite broad, connected by a linear median portion, the medasternite much broader than long, densely covered with unmodified hair-like setae, separated from the presternite basally by a wide membraneous area, the poststernal strip membraneous, usually slightly incurved medially; lateral portions of sixth presternite robust, protuberant and slightly pubescent apically, distinctly demarked from the extensive medasternal areas which project apically much beyond the lateral portions of the presternite, these areas slightly narrowed apically, slightly separated medially, and well covered with long hair-like medially directed setae, the poststernal lobe membraneous, very broad and short, the latero-apical angles produced into rounded wing-like lateral lobes.

Genital armature: Stipites robust, constricted above base, sinuate beyond this where the dorsal surface is setose along the incurved inner margin, bilobate apically, the dorsal lobe broad, flat, concave on the inner surface, ventral lobe long, slender, curved apically toward the dorsal lobe; sagittae broad medially in dorsal aspect, the tips narrowed, very slightly exceeding the stipites in length; volsellae more or less membraneous, usually truncate apically.

GENOTYPE: *Megachile latimanus* Say. [Orthotype.]

This group is ground-nesting in habit, tunnelling into the soil and building typical leaf-cells in these tunnels. Sladen[3] has observed *perihirta* nesting gregariously in a nearly new and bare gravel railway embankment, and Hicks[4] has found this same species nesting in the ground.

A personal observation was made of the nest-building habit of *latimanus*, a description of which follows:

The nest was first observed on September 13, being first discovered and pointed out to me by Dr. O. E. Plath. The site was watched, and soon a female was observed to approach with a piece of leaf. The tunnel was then found to be on a slight grade, with the entrance immediately adjacent to a small stone. The bee made three trips in five minutes, carrying in a piece of leaf between her legs each time, using about a minute and a quarter for each trip, and about fifty seconds in the nest after each trip. Twice she stopped a few inches from the nest for ten or fifteen seconds before entering, apparently resting, expanding and contracting the abdomen rapidly, then flying to the entrance and walking in with the piece of leaf beneath her.

At the end of the third trip, instead of flying off after another piece of leaf, she came to the entrance, turned around and backed into the hole again, scratching the soil back beneath her into the hole. This she repeated several times, once coming out, reversing and going in head foremost. She then flew off, and did not return to the nest during the half hour which I remained to watch. I had apparently arrived just in time to see her finish her task. Upon examination of the trees in the immediate vicinity, a small seedling oak was located which was apparently the source of the supply of leaves.

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[3] Can. Ent., L, p. 302, (1918).

[4] Univ. Colo. Stud., (15), III, p. 233, (1926).

On September 28 the nest was dug up. It was lying in a horizontal position in the ground, about half an inch below the surface, the end of the cell about half an inch from the original opening of the burrow. On October 15 the cell was opened. The wall was constructed of sixteen pieces, each approximately 18 mm. long by 10 mm. in breadth. There were four circular pieces from 8 to 9 mm. in diameter at the botton, while the cap at the top was composed of fourteen circular pieces with an average diameter of 8 mm. Thus there was a total of thirty-four pieces in the construction and sealing of this single cell. All of the pieces had been cut quite regularly and smoothly. The larva had spun a cocoon which was 13 mm. long and 7 mm in diameter, ovoid in shape. It was quite tough and difficult to cut with anything but very sharp microscissors. The larva had not pupated at that time.

Key to Species of Xanthosarus

Females

1. Scopa on fifth and sixth sterna entirely black ....*comata* Cresson
   Scopa entirely pale 2
2. Pubescence of mesonotum entirely whitish ....*innupta* Cockerell
   Mesonotum and abdomen with definite black pubescence 3
3. Abdominal fasciae quite broad and conspicuous for their entire length, white, the pubescence of the first and second abdominal segments entirely white 4
   Abdominal fasciae narrower and more inconspicuous, especially medially, usually more ochraceous, and pubescence of first and second abdominal segments more yellowish 5
4. Fourth and fifth abdominal terga very closely punctate, and clypeus uniformly closely punctate ....*pallidiana* Mitchell
   Fourth and fifth terga more finely punctate, with definite intervening shining spaces; clypeus with a shining less closely punctate median line ....*dentitarsus* Sladen
5. Western; patch of black pubescence on mesonotum covering more than half of the disc and often extending onto the scutellum.
   perihirta Cockerell

Eastern; patch of black pubescence on mesonotum covering hardly more than half of the disc, and usually not extending onto the scutellum. *latimanus* Say

Males

1. Mid coxae with long slender sharply pointed spines; mid metatarsi simple ....*comata* Cresson
   Mid coxae not spined; mid metatarsi protuberant at base beneath 2
2. Mesosternum with a slender sharply pointed spine in front of each mid coxa ....*dentitarsus* Sladen
   Mesosternum not spined 3
3. Protuberance of mid metatarsus narrow and keel-shaped (Pl. VIII); anterior margin of hind metatarsus quite evenly convex, not angulate. *perihirta* Cockerell
   Protuberance of mid metatarsus quadrate, robust, or if somewhat keel-shaped, then the hind metatarsi are angulate anteriorly 4
4. Mid metatarsal protuberance robust and quadrate (Pl. VIII); anterior margin of hind metatarsus evenly convex ....*latimanus* Say
   Mid metatarsal protuberance neither quadrate nor robust, rather distorted keel-shaped (Pl. VIII); anterior margin of hind metatarsus strongly angulate ....*cochisiana* Mitchell

Megachile (Xanthosarus) cochisiana Mitchell (Pl. VIII.)

Megachile (Xanthosarus) cochisiana Mitchell, Trans. Am. Ent. Soc. LIX, p. 313, 1934.

With the exception of the male sternites and genital armature this species was fully described and its most distinctive structural peculiarity figured in Part I of this Revision (Mitchell, 1934, Pl. XXI). Both the sternites and genital armature are similar to those of the other species of *Xanthosarus*, most nearly resembling the corresponding structures in *dentitarsus* (see Pl. IX), the fifth medasternite being broad and rather definitely separated from the lateral portions of the presternite by a narrow, more membraneous area.

Type.—Male; Hereford, Cochise County, Arizona, (W. M. Mann), [U. S. N. M., no. 40570].

Range.—Arizona and south into Mexico. The four specimens of the type series are all from Arizona. One additional specimen has since come to hand, bearing the following data: Guadalajara, Mexico, Aug. 8, 1903, (McLendon), [A. N. S. P.].

The female of *cochisiana* is not known with certainty, although the discovery of the male from Guadalajara, Mexico, indicates the possibility, if not the probability that the series of females from that place referred to as *perihirta* (see Mitchell, 1930) represents the female of this species. This series of specimens shows some differences in the pubescence and puncturation which may be of some specific value, but are of relatively little help in arriving at a positive identification. The abdominal fasciae resemble those of *dentitarsus*, being broad and white, and the pale pubescence is white rather than yellowish, thus resembling *dentitarsus* in both of these characters. It differs from *dentitarsus*, however, in the conspicuous black pubescence of the vertex, and the presence of dark pubescence to a limited amount on the second tergum, thus resembling *perihirta* to a degree. The punctures on the vertex medially, back of the ocelli are very fine and dense, rather more so than in any of the other females of *Xanthosarus*.

Megachile (Xanthosarus) comata Cresson (Pls. VIII and IX.)

Megachile comata Cresson, Trans. Am. Ent. Soc., IV, p. 262, 1872. Cockerell, Denison Univ. Bull., XI, p. 65, 1898. Friese, Das Tierr., Lfg. 28, Apidae I, p. 235, 1911. Cockerell, Ann. Mag. Nat. Hist., (8), XI, p. 531, 1913. Cockerell, Ann. Mag. Nat. Hist., (8), XV, p. 532, 1915. Cresson, Mem. Am. Ent. Soc., I, p. 115, 1916.

Megachile texana (female only) Cresson, Trans. Am. Ent. Soc., VII, p. 125, 1878. Cockerell, Denison Univ. Bull., XI, p. 65, 1898. Friese, Das Tierr., Lfg. 28, Apidae I, p. 247, 1911.

Megachile fortis Cockerell, Denison Univ. Bull., XI, p. 65, 1898. Cockerell, Ann. Mag. Nat. Hist., (7), VI, p. 10, 1900. Friese, Das Tierr., Lfg. 28, Apidae I, p. 237, 1911.

Megachile paratexana Mitchell, Trans. Am. Ent. Soc., LVI, p. 226, 1930.

This differs from the other species of *Xanthosarus* in the presence of the conspicuous mid coxal spines, the mid tibial spurs, and in the unmodified condition of the mid metatarsus. Its relationship to the other species of *Xanthosarus* is clearly evident, however, by the characteristics of the fifth and sixth sterna and genital armature of the male and by the structural characteristics of the female.

Female.—Size: Length 14-15 mm.; breadth of abdomen 5-6 mm.; anterior wing 10.5-11 mm.

Structure: Face somewhat broader than long; eyes subparallel; clypeal margin straight, finely and irregularly crenulate; lateral ocelli subequally distant from eyes and edge of vertex, and also from each other; vertex nearly flat; cheeks broader than eyes.

Puncturation: Close and fine on cheeks, vertex medially, and on pleura above; slightly more coarse but very close on clypeus, about equally coarse on dorsum of thorax, close in general, but rather sparse in center of mesonotum; very fine and close on abdomen basally, becoming slightly more coarse and more distinctly separated to the fifth tergum, fine and close on the sixth.

Color: Black; antennae beneath and tegulae more piceous; wings subhyaline basally, slightly clouded apically, the nervures piceous; spurs yellowish-ferruginous.

Pubescence: Whitish on head, thorax, legs and basal segment of abdomen, but vertex with fuscous pubescence and mesonotum with a large fuscous patch; third to sixth abdominal terga with largely black pubescence, and a slight amount at the sides of the second, the sixth with some apical subappressed silvery pubescence; second to fifth with entire white apical fasciae; scopa white on second to fourth sterna, entirely black on the fifth and sixth.

Male.—Size: Length 13 mm.; breadth of abdomen 5 mm.; anterior wing 10 mm.

Structure: Face very slightly broader than long; eyes slightly convergent below, clypeal margin slightly outcurved, with several small irregular denticulations medially; inferior margin of mandible angulate midway between the apical tooth and the apex of the inferior projection; basal joint of flagellum somewhat longer than pedicel, the second joint only very slightly longer than the first, the apical one but very slightly dilated and flattened; lateral ocelli very slightly nearer eyes than to edge of vertex, subequally distant from each other and from edge of vertex; vertex flattened; cheeks broader than eyes; front coxal spines robust, long, somewhat narrowed to the rounded apices; front femora slightly keeled beneath apically; front metatarsus subequal in length to the remaining tarsal joints combined, the front and hind margins subparallel, produced slightly at apex; mid femur much swollen, the tibia with an apical spur, the metatarsus simple and unmodified, each mid coxa with a long slender acutely pointed spine; hind tibia but slightly curved, the metatarsus somewhat parallel-sided, the anterior margin nearly straight; abdomen quite short and broad, fourth and fifth terga with apical margins distinctly depressed over entire width, the margins of the second and third depressed only toward the sides; disc of sixth tergum vertical in position, the carina short, with an indefinite median emargination, irregularly crenulate or denticulate on each side; seventh tergum rather broad and robust, with but a very minute median pointed projection.

Sternites: Fifth medasternite more or less ovoid, sometimes slightly constricted medially, about twice as broad as long, well covered with short setae, produced slightly beyond the apical margin of the lateral portions of the presternite, which are broad and extensive, poststernal strip narrowly emarginate medially; sixth sternum typical of the group *Xanthosarus* with its poststernal lobe triangularly produced medially and the latero-apical angles produced into subacute lobes.

Genital armature: Similar to other species of *Xanthosarus,* but the stipites not so markedly sinuate and setose as in the other species, considerably exceeded by the tips of the sagittae.

Puncturation: Fine and very close on cheeks, vertex medially, and over entire thorax; relatively more distinct but quite close on vertex laterally; very fine and close on abdomen basally, becoming somewhat coarser and more distinct, yet quite close, on the fourth and fifth terga, fine close and shallow on the sixth.

Color: Black; antennae piceous; tegulae largely yellow anteriorly, darker posteriorly; angulate area of lower margin of mandible yellowish; wings subhyaline, faintly clouded apically, the nervures ferruginous to piceous; front coxae dark ferruginous laterally, the femur yellowish-ferruginous except for the dark apical portion of posterior face; outer face of front tibia dark basally, becoming ferruginous and then yellow toward apex, ferruginous on the other two faces; front tarsi yellow, with darker stripes and spots beneath; mid tibia sometimes ferruginous anteriorly, piceous or black along the posterior border, otherwise the mid and hind legs black, spurs yellowish.

Pubescence: Entirely pale ochraceous on head, thorax, legs, and basal abdominal segments, discs of the fourth and fifth terga with variable amounts of dark pubescence, but entirely pale on the sixth, the more apical segments with entire whitish apical fasciae; front tarsal fringe white, brown at tip beneath, mid tarsal fringe more ochraceous, very short, outer surface of the metatarsus obscured by the dense pale pubescence.

Type.—Male; Texas, (Belfrage), [U. S. N. M., no. 1776].

Range.—Kansas and Colorado, through the border states to Mexico, April to October. Definite records are as follows:

ARIZONA: 1♂, Mt. Lemōn, St. Catalina Mts., 9150 ft., July 27, 1917. 1♀, Mud Springs, S. Catalinas, Aug. 19, 1916. Also identified from Flagstaff.

CALIFORNIA: 1♂, Pine Valley, San Diego County, (W. J. Chamberlin). Also identified from Sweetwater River.

COLORADO: 1♀, Boulder, July 27, 1922, 5600 ft. 2♀, Boulder County, Aug. 2, 1925, (C. P. Custer). 2♀, Florissant, Sept. 10 and 16, 1925, (Hicks; F 60). 1♀, Hubbard Ranch, Elbert, June 9, (Figgins; on *Gilia*).

MEXICO: 7♂, 3♀, Meadow Valley, (Townsend).

NEW MEXICO: 3♂, 2♀, Cloudcroft, May 24 to June 18, 1902. 1♀, Cloudcroft, Aug. 3-10, 1903, (W. Knaus). 1♂, Fort Wingate, Sept. 3, 1908, (John

Woodgate). 1♀, Jemez Springs, Aug. 3, 1914, (J. Woodgate). 1♀, Sacramento Mts., Oct., (Townsend).

TEXAS: 4♀, no locality record. 1♀, Fedor, Lee Co., Oct. 1909. 1♀, Fedor, Sept. 24, 1897, (Birkmann). 2♂, Kerrville, Apr. 12, 1907, (F. C. Pratt; on *Marrubium vulgare*).

Flower records.—Marrubium vulgare and *Gilia.*

Megachile (Xanthosarus) dentitarsus Sladen (Pl. IX.)

Megachile diligens Sladen (nec. Smith), Agr. Gaz. Can., Feb., p. 125, 1918.
Megachile diligens Sladen (nec. Smith), Can. Ent., L, p. 302, 1918.
Megachile dentitarsus Sladen, Can. Ent., LI, p. 85, 1919.

The female of *dentitarsus* may be separated from most of the other species of *Xanthosarus* by the relatively dense and conspicuous white abdominal fasciae. The males are easily distinguished by the presence of the small sharp spines on the mesosternum, these being represented by low carinae in the other species. These mesosternal spines must not be confused with the long slender mid coxal spines of *comata* however.

Female.—Size: Length 13-14 mm.; breadth of abdomen 4.5-5 mm.; anterior wing 9-10 mm.

Structure: Face slightly broader than long; eyes subparallel; clypeal margin straight, faintly and irregularly crenulate; lateral ocelli slightly nearer edge of vertex than to eyes, subequally distant from eyes and from each other; vertex flattened; cheeks broader than eyes.

Puncturation: Fine and close on cheeks, vertex medially and on pleura; somewhat more coarse but close on clypeus except for an indefinite median impunctate line; sparse on supraclypeal area, and somewhat so on vertex laterally; close and rather fine on dorsum of thorax, but more coarse and distinct in center of mesonotum and scutellum; minute on abdomen, close basally, but becoming more distinct and separate to the fifth tergum, close on the sixth.

Color: Black; antennae piceous beneath; tegulae deep ferruginous, almost piceous; wings hyaline basally, faintly clouded apically, the nervures ferruginous to piceous; spurs yellow.

Pubescence: White on head, thorax, legs and first two abdominal segments, but vertex with fuscous hair laterally, and mesonotum with a transverse median fuscous patch; third to fifth abdominal terga with blackish pubescence on discs, that on the sixth entirely white, erect basally, more or less appressed apically; second to fifth terga with quite broad and dense white apical fasciae, entire except on the second; scopa bright ochraceous, somewhat paler basally.

Male.—Size: Length 12-13 mm.; breadth of abdomen 5 mm.; anterior wing 9-10 mm.

Structure: Face about as broad as long; eyes very slightly convergent below; clypeal margin with a few obscure minute indentations medially; inferior margin of mandible straight between the apical tooth and the apex of the inferior projection; basal joint of flagellum very slightly longer than pedicel, considerably shorter than the second joint, apical one not appreciably dilated or flattened; lateral ocelli slightly nearer eyes than to edge of vertex, subequally distant from eyes and from each other; vertex flattened; cheeks broader than eyes; front coxal spines flattened, robust and rather long, tips triangularly pointed; front femur with a keel on inferior margin apically which is obscured by the dense pubescence of the posterior face; front metatarsus subequal in length to the second to fourth joints combined, about equally as broad at apex as at base, and but slightly produced apically; mid femur much swollen, the lower surface flattened and slightly concave, the tibia rather slender and slightly curved, lacking the usual apical spur, the metatarsus with a narrow subquadrate obtuse protuberance beneath; hind tibia slightly curved, anterior margin of the metatarsus rounded; mesosternum with a small slender acute spine anterior to each mid coxa; abdomen short and broad, apical margins of the third to fifth terga quite distinctly depressed, that of the second only toward the sides; disc of sixth tergum vertical in position, the carina short, with a small median emargination which is often vague and indefinite, finely denticulate or crenulate on each side; seventh tergum with a very minute median triangularly pointed projection.

Sternites: Fifth medasternite about equalling each lateral portion of the presternite in breadth, and rather definitely separated from these laterally; otherwise typical of *Xanthosarus* (see p. 120).

Genital armature: Typical of *Xanthosarus* (see p. 121).

Puncturation: Close and fine on cheeks, vertex medially and over entire thorax; more coarse and sparse on vertex laterally; minute and close on abdomen basally, becoming somewhat more distinct and sparse, yet very fine on the shining discs of the fourth and fifth terga, minute shallow and close on the sixth.

Color: Black; antennae piceous beneath; mandibles yellow along inferior margin; tegulae yellowish anteriorly, becoming dark posteriorly; wings subhyaline, slightly clouded apically, nervures ferruginous to piceous; front femur ferruginous except for the dark apical portion of the posterior face; front tibia largely ferruginous, but the outer face dark basally and yellow apically; front tarsi yellow; mid and hind legs black, the spurs yellow.

Pubescence: Entirely pale ochraceous, bright in some specimens, with no evident dark admixture, the abdominal fasciae obscure and indefinite; front tarsal fringes whitish, more ochraceous basally and beneath, dark brown at tip; mid tarsal fringe long and thin, entirely ochraceous.

Type.—Two specimens have been designated by Viereck as the holotype and allotype respectively, as follows: Holotype;

Male, Medicine Hat, Alberta, Aug. 1, 1917, (Sladen), [Can. Nat. Coll., no. 386]. Allotype; Female, Medicine Hat, Aug. 1, 1917, (Sladen, on alfalfa), [Can. Nat. Coll.].

According to the international rules of nomenclature, however, these cannot be considered holotype and allotype. The original description consists of only a photograph and the name, but is accompanied by localities and dates of collection, and according to Dr. Walley at the Canadian Department of Agriculture these dates do not correspond with those on the subsequently designated types nor on any of the so-called paratype specimens. All of these are thus automatically eliminated from consideration as holotype or allotype, but may be considered *topotypes,* since they were collected in the type locality by the author and identified by him.

Range.—Alberta to Washington and south through the Dakotas and Montana to Utah and New Mexico, June to September. Definite records are as follows:

ALBERTA: 1♀, Lethbridge, July 18, 1917. 1♀, Medicine Hat, Aug. 23, 1919, (both Sladen).

COLORADO: 5♀, no data. 1♂, 2♀, Boulder County, June 13 and Aug. 9, 1925, (Hicks). 1♂, Boulder County, Sept. 18, 1925, (C. P. Custer). 2♂, Denver, June 21, 1902. 2♂, Dixon Canyon, Apr. 11, 1905. 2♀, Fort Collins, Aug. 4 and 9, 1899. 1♂, Fort Collins, June 1908, (V. A. Armstrong). Identified also from Pueblo (Aug.).

MONTANA: 1♂, 5♀, no data. 1♂, Pondera County, Aug. 20, 1926. Identified in addition from Fairview (Sep.) and Hill County.

NEBRASKA: 1♀, Alliance, Box Butte County, July 14, 1909, (J. A. G. R.). 1♂, Glen, Sioux County, 4,000 ft., July 12, 1910, (L. Bruner). 1♀, Mitchell, July 11, 1912, (Swenk; collecting pollen on *Medicago sativa*). 1♀, Mitchell, June 23, 1913, (L. M. Gates; on *Helianthus petiolaris*). 1♂, Mitchell, Aug. 12, 1916, (C. E. Mickel). 3♂, Mitchell, Aug. 19, 22 and 27, 1915, (E. M. Patridge; on *Melilotus alba*). 2♀, Sidney, Aug. 25, 1893. 1♀, Sioux County. 1♀, War Bonnet Canyon. Seen also from Bridgeport, Dundy County (June), Haigler (July), Harrison (Aug.), Halsey, Omaha (June) and Valentine (June).

SOUTH DAKOTA: 2♀, Rapid City. Also identified from Elk Point.

WASHINGTON: 1♂, 1♀, Yakima City, July 2, 3, 4, 1882.

Specimens of *dentitarsus* have been identified also from the following localities: New Mexico—Pecos; North Dakota—Dickinson, Mott, Sentinel Butte, Williston; Utah—Salt Lake City; Wyoming—Big Horn Basin, New Castle.

Flower records.—*Aster* sp. *Medicago sativa, Grindelia squarrosa, Cleome serrulata, Trifolium pratense, Helianthus petiolaris, Melilotus alba, Solidago rigida, Gutierresia sarothrae* and *Verbena* sp.

Megachile (Xanthosarus) innupta Cockerell

Megachile innupta Cockerell, Ann. Mag. Nat. Hist., (8), xv, p. 534, 1915.

Female.—Size: Length 12 mm.; breadth of abdomen 4 mm.; anterior wing 8.5 mm.

Structure: Face very slightly broader than long; eyes slightly convergent below; clypeal margin straight, with minute indistinct irregularities rather than denticulations; lateral ocelli very slightly nearer edge of vertex than to eyes; vertex flat; cheeks broader than eyes.

Puncturation: Fine and indistinct on cheeks; close and fine on clypeus laterally, vertex medially, pleura above, and over a large part of mesonotum and scutellum; more coarse, deep and distinct on clypeus medially, vertex laterally and pleura above, rather sparse on vertex laterally; scutellum with a median impunctate space; minute, close and indistinct over most of abdomen, becoming slightly more distinct toward the fifth tergum, crowded on the sixth.

Color: Black; antennae reddish-piceous; tegulae dark ferruginous; wings hyaline, slightly clouded apically, the nervures yellowish-ferruginous; spurs yellowish.

Pubescence: A few inconspicuous black hairs on vertex, otherwise entirely white on head, thorax, legs and first two abdominal terga, but somewhat more ochraceous on legs; blackish on discs of third to fifth terga, largely ochraceous on the sixth, but with a few basal dark hairs; third to fifth terga with entire and quite dense and conspicuous white apical fasciae, that on the second obscure, lacking on the first; scopa distinctly ochraceous on fifth and sixth sterna, whitish on the second to the fourth.

Type.—Female: Pueblo, Colorado, Aug. 10, '07, (G. M. Hite), [U. S. N. M., no. 29, 379].

The above description was made from the type specimen. With but this single specimen it is difficult to determine its status, but it is possible at least that it is an abnormal specimen of one of the other species of *Xanthosarus*.

Megachile (Xanthosarus) latimanus Say (Pls. VIII and IX.)

Megachile latimanus Say, West. Quart. Rep. Cincinnati, II, p. 81, 1823. LeConte, Compl. Writ. T. Say, I, p. 169, 1859. Provancher, Nat. Can., XIII, p. 227, 1882. Provancher, Pet. Fauna Ent. Can., p. 710, 1883. Cockerell, Denison Univ. Bull., XI, p. 65, 1898. Cockerell, Ann. Mag. Nat. Hist., (7), VI, p 10, 1900. Cockerell, Can. Ent., XXXV, p. 216, 1903.

Cockerell, Univ. Colo. Stud., IV, no. 4, p. 253, 1907. Friese, Das Tierr., Lfg. 28, Apidae I, p. 240, 1911. Cockerell, Can. Ent., XLIV, p. 354, 1912. Sladen, Can. Ent., L, p. 302, 1918. Cockerell, Proc. U. S. N. M., LV, p. 215, 1920.

Megachile femorata Smith, Cat. Hym. Brit. Mus., I, p. 188, 1853. Cockerell, Can. Ent., XLIV, p. 354, 1912. Strand, Arch. Naturges, LXXXIII A, 11, p. 67, 1917. Cockerell, Ann. Mag. Nat. Hist., (9), XII, p. 247, 1923.

Megachile acuta Smith, Cat. Hym. Brit. Mus., I, p. 192, 1853. Cockerell, Trans. Am. Ent. Soc., XXXI, p. 337, 1905.

Megachile frigida Provancher, Nat. Can., XIII, p. 227, 1882. Provancher, Pet. Fauna Ent. Can., p. 710, 1883.

Megachile mendica Provancher, Nat. Can., XIII, p. 231, 1882. Provancher, Pet. Fauna Ent. Can., pp. 710 and 715, 1883.

Xanthosarus latimanus Robertson, Trans. Am. Ent. Soc., XXIX, p. 172, 1903. Titus, Proc. Ent. Soc. Wash., VII, p. 154, 1905.

Xanthosarus femorata Titus, Proc. Ent. Soc. Wash., VII, p. 153, 1905.

M[egachile] (Xanthosarus) latimanus Lovell and Cockerell, Psyche, XIV, p. 18, 1907.

Megachile canadensis Friese, Das Tierr., Lfg. 28, Apidae I, p. 235, 1911.

M[egachile] (Xanthosarus) latimana Viereck, Conn. Nat. Hist. Surv. Bull., XXII, p. 742, 1916.

The male of *latimanus* may be recognized easily by the quadrate mid metatarsal protuberance. The female is so close in both structure and color to that of *perihirta*, however, that the two are nearly impossible to separate by anything other than geographical distribution. The patch of dark pubescence on the mesonotum averages slightly smaller in *latimanus*, but individual variations destroy the value of this character as a means of identification. In general, specimens taken east of Alberta, Montana, Wyoming and Colorado may be safely determined as *latimanus*, while those taken west of these states can only be *perihirta*. Within these border states it is safest to base determinations on the males until more careful studies have been made of the distribution of the two species with reference to the continental divide.

Female.—Size: Length 13-14 mm.; breadth of abdomen 5 mm.; anterior wing 9-10 mm.

Structure: Face broader than long; eyes subparallel; clypeal margin straight, often with some minute irregular crenulations; lateral ocelli slightly nearer edge of vertex than to eyes, and slightly nearer eyes than to each other; vertex nearly flat; cheeks slightly broader than eyes.

Puncturation: Close and rather fine on cheeks, vertex medially, clypeus laterally, and over entire thorax except mesonotum anteriorly; slightly more coarse and distinct in center of clypeus; rather sparse on vertex laterally; extremely fine on abdomen, close basally and on the sixth tergum, but becoming somewhat more distinct to the fifth.

Color: Black; antennae beneath and tegulae somewhat piceous; wings subhyaline, slightly clouded apically, the nervures ferruginous to piceous; spurs yellow.

Pubescence: Pale ochraceous over most of head, thorax, legs, and the first two abdominal segments, but vertex with considerable fuscous pubescence, and a fuscous patch on posterior half of mesonotum; third to fifth abdominal terga with largely dark pubescence, and a few dark hairs visible toward the sides of the second, the sixth with largely pale erect hairs, with subappressed ochraceous or reddish pubescence apically, the second to the fifth with pale ochraceous or grayish apical fasciae, interrupted or thin medially on the more basal terga, entire on the more apical ones; scopa entirely bright ochraceous.

Male.—Size: Length 12-13 mm.; breadth of abdomen 4.5-5 mm.; anterior wing 9-10 mm.

Structure: Face very slightly broader than long; eyes very slightly convergent below; clypeal margin nearly entire, with a very shallow median emargination; inferior margin of mandible straight between the apical tooth and the apex of the inferior projection; basal joint of flagellum subequal to pedicel, the second joint about twice as long, the apical one very slightly dilated and flattened; lateral ocelli subequally distant from eyes, edge of vertex, and from each other; vertex flattened; cheeks broader than eyes; front coxal spines robust basally, gradually narrowed to the acute tips; front femur with keel of inferior margin obscured by the dense pubescence of the posterior face; front metatarsus about equal in length to the second to fourth joints combined, narrower at apex than at base, not produced apically, the anterior groove broad and deep; mid femur much swollen basally, mid tibia lacking the apical spur, but only slightly modified in other respects, the metatarsus with a broad quadrate robust shining protuberance; hind tibia slightly curved, the metatarsus evenly rounded on anterior margin, about twice as long as broad; mesosternum with a short but rather robust carinate projection anterior to each mid coxa; abdomen rather short and broad, apical margins of the fourth and fifth terga quite deeply depressed over entire width, distinctly depressed toward the sides on the second and third; disc of the sixth tergum vertical in position, the carina broad and short, with a small and rather variable median emargination, more or less crenulate on each side; seventh tergum quite robust, with at most but a very minute median pointed projection.

Sternites: Fifth medasternite much broader than the lateral portions of the presternite, with which it is contiguous; otherwise typical of *Xanthosarus* as described on p. 120.

Genital armature: Typical of *Xanthosarus* and showing no marked variations from the other species (see p. —?—).

Puncturation: Fine and close on cheeks, vertex medially, and over entire thorax except for the shining and almost impunctate mesosternum anterior to the carinate protuberances; more distinct and with evident shining intervening spaces on vertex laterally; very fine and close on abdomen basally, becoming somewhat more coarse and more widely separated on the fourth and fifth terga, but fine and close on the sixth.

Color: Black; antennae piceous; mandibles ferruginous along inferior margin; tegulae obscurely ferruginous; wings subhyaline, slightly clouded apically, the nervures ferruginous to piceous; front coxae ferruginous in part, the trochanters dark, the femur ferruginous except for the dark apical portion of the posterior face, the tibia entirely ferruginous, the tarsus entirely ivory-yellow except for a dark spot on second joint beneath; mid and hind legs entirely black, spurs yellow.

Pubescence: Entirely pale ochraceous or fulvous over entire insect, with no dark admixture at all evident; abdominal fasciae rather indefinite; front tarsal fringe white, slightly browned at tip beneath; mid tarsal fringe thin and entirely white.

Range.—North Carolina to Nova Scotia, west to Alberta, Wyoming and Colorado, June to September. Definite records are as follows:

COLORADO: 1♀, (C. F. Baker). 1♂, no locality record, May 26, 1877, (with nest). 1♀, Highmores, July 19, (Cockerell; on *Asclepias*). Identified also from Boulder, Chimney Gulch, Clear Creek, Colorado Springs, Denver, Platte Canyon, Timnath and Ute Creek.

CONNECTICUT: 6♂, 10♀, Hartford, Aug. 2 to Sept. 23, 1892-1899, (on *Aster, Eupatorium purpureum* and *Vernonia*). 1♀, Union, June 25, 1921: 1♂, (homotype of *M. femorata* Smith, by Waterston), 2♀, Wallingford, Aug. 13 and Sept. 11. Identified also from Chapinville, Colebrook and Lyme.

DELAWARE: 1♀, no locality record.

GEORGIA: 2♀, no locality record.

ILLINOIS: 1♀, no locality record. 1♂, 4♀, Algonquin. 1♀, Chicago, Aug. 20, 1892. 1♀, Landers, Sept. 10, 1932, (H. Pearson). 1♀, Palos, June 19, 1932, (H. Pearson). 1♀, Springfield, Sept. 21, 1932 (H. Pearson). Identified also from Hancock and McHenry.

INDIANA: 1♀, no locality record. Identified from Elkhart and Lafayette.

IOWA: 1♀, Ames, (E. D. Ball). 4♀, Ames. Sept. 19, 1932 (J. Pearson). 1♂, Ames, Aug. 18, 1934, (H. A. Scullen).

KANSAS: 1♀, no locality record. 1♂, Topeka, Sept. 20, 1932, (H. Pearson). Identified also from Riley County (Sept.).

MARYLAND: 1♂, no locality record. 1♀, Chestertown, Aug. 17, 1899, (E. G. Vanatta).

MASSACHUSETTS: 1♂, 3♀, no locality record. 1♀, Fairhaven, Aug. 14, 1926, (Mitchell), (homotype of *M. acuta* Smith, by Waterston). 9♂, 15♀, Forest Hills, June 30-Aug. 19, (Mitchell; on *Baptisia, Asclepias, Rudbeckia* and *Vicia*). 1♀, Needham, July 17, 1926, (Mitchell; on *Baptisia*). 2♂, Southampton, July 10 and 11, 1894. Identified also from Bridgewater, Cohasset, Great Barrington, Hyannis, Manomet, Mt. Tom, Nantucket, Provincetown, Rockport, Scituate, Squantam, Taunton, Tisbury, Tyngesboro, Wellesley, Wollaston and Woods Hole.

MICHIGAN: 1♀, Lansing, July 7, 1876, (from H. A. Cook, Jan. 17, 1883). 1♂, Pequaming, July 4, 1903, (Morgan Hebard). Identified also from Douglas Lake, Gillette, Grand Rapids (all July), and State College.

NEBRASKA: 6♂, Lincoln, (May). 1♂, West Point, Sept. 19, (L. Bruner). 1♀, West Point, Sept. 13, (Crawford). Identified also from Ashland, Hat Creek, Nebraska City, Omaha, Wabash and War Bonnet Canyon.

NEW HAMPSHIRE: 1♀, Hanover, (C. M. Weed). 1♀, Lancaster, Sept. 1, 1908, (Timberlake). Also identified from Alstead, Compton, Hanover, and N. Conway.

NEW JERSEY: 2♂, no locality record 1♀, Angora, June 3. 1♀, Blackwood, Sept. 19, 1897. 1♀, Gloucester County, Aug. 10, 1890. 1♂, Westville, Aug. 26, 1899. Identified also from Ramsey (Aug.) and Rocky Hill.

NEW YORK: 1♂, Crater Club, Essex County, Aug. 1922. Identified from Aquaduct, Bronxville (Aug.), Cold Springs Harbor, Fishers, Gardiners Isle, Ithaca, Jamaica, Long Beach, McLean, Naples, Niverville, Nyack, Rochester, and Stockport.

NORTH CAROLINA: 1♀, Cruso, June 28, 1934, (on *Pentstemon*). 1♀, Horse Cove, Highlands, July 25, 1923. 2♂, 2♀, Swannanoa, Sept. 5 and 6, 1924, (on *Vernonia*), (all Mitchell). 1♂, Smokemont, July 20, 1923, (Crawford; on *Prunella vulgare*).

OHIO: 1♀, Toledo, July 29, 1932, (H. Pearson). 2♂, 1♀, Wauseon, Aug. 1 & 5, 1896. Identified from Columbus, Marietta, Smithfield, Sugar Grove, and West Jefferson.

PENNSYLVANIA: 1♂, no locality record. 1♂, Braddock, Sept. 19, 1933, (H. A. Scullen). 1♀, Collingdale, Delaware County, Aug. 31, 1897. 1♀, Lopez, Sullivan County, Aug. 4-15, 1913, (Witmer Stone). 5♀, Lehigh Gap, June 27 to July 20, 1900-1902. 2♀, North Mt. 2♀, Philadelphia, Aug. 28 and Sep. 5, 1897. 1♀, Philadelphia Neck, Sep., (H. Hornig). 1♀, Swarthmore, July 16, 1905. Identified also from Carlisle (June), Harrisburg, Lake Winola, North Cumberland (June) and Pittsburgh.

QUEBEC: 2♂, Berthierville, July 10 and 28, 1930, (L. Daviault). 1♀, Fort Coulonge, Aug. 25, 1919, (Jos. I. Beaulne). 1♂, Lanoraie, Aug. 19, 1932. 1♀, St. Martin, Aug. 29, 1925. 1♀, Terrebonne, Aug. 30, 1925; (both J. W. Buckle). Identified also from Coney Hill, Kirks Ferry, Shawbridge and St. Hilaire.

SOUTH DAKOTA: 10♂, 14♀, Volga.

VERMONT: 1♂, Winooski, Aug. 21, 1901. Identified from Bridgeport, Grand Isle, St. Johnsbury, Stowe, and Woodstock.

VIRGINIA: 1♂, 1♀, no locality record. 1♀, no locality record, July 25, 1880, (Coll. C. V. Riley). Identified from Falls Church, Glen Carlyn and Pennington Gap.

Specimens of *latimanus* have been identified also from the following localities: Alberta—Calgary (Aug.), Lethbridge (July); Maine—Bethel, Calais, Norway, Whitneyville; Minnesota—Frazee, Lake Park, Mabel (July), Minneapolis, Pelican Lake (Aug.), St. Cloud; North Dakota—Bismark, Canon Ball, Churches Ferry, Courtney, Devils Lake, Dickinson, Edgeby, Fargo, Glenullin, Mandon, Monango, Mott, Oaks, Sheldon, Steele, Valley City, Wales, Williston; Nova Scotia—Smiths Cove; Ontario—Bobcaygeon, Grimesly, Ottawa, Port Hope, Toronto; Rhode Island—Black Island; Saskatchewan-Melcort; West Virginia-Bargers Springs, Baileysville, Greer; Wisconsin—Clyman Junction, Cranmoor (Aug.), Lake Geneva (June), Milwaukee, Ocanto Falls; and Wyoming—Carbon County.

Flower records. — About half of the flower records are Composites, including species of *Aster, Helianthus, Solidago, Grindelia, Rudbeckia, Taraxacum, Carduus, Eupatorium, Chrysopsis,* etc. Next to these, Legumes seem to be preferred, species of *Kuhnistera, Medicago, Melilotus, Psoralea, Amorpha, Petalostemum, Vicia* and *Baptisia* being represented. Other scattered records include species of *Monarda, Campanula, Stachys, Teucrium, Asclepias, Agastache, Althaea, Sanchus, Physostegia, Cleome, Traumeria, Chamaemerion, Mentzelia, Penstemon, Verbena* and *Convolvulus.*

Megachile (Xanthosarus) pallidiana Mitchell

Megachile (*Xanthosarus*) *pallidiana* Mitchell, Trans. Am. Ent. Soc., LIX, p. 314, 1934.

As this species was fully described in Part I of this Revision, it will not be repeated here. With but a single specimen as the basis of judgment, its status is not quite clear, especially as the females of this group of species must be separated by characters which are evidently variable.

Type. — Female; Albuquerque, New Mexico, August 1894, (Snow), [Cornell Univ., no. 1109].

In the original designation of this type specimen, the type number was unintentionally omitted.

Megachile (Xanthosarus) perihirta Cockerell (Pl. VIII.)

Megachile perihirta Cockerell. Ann. Mag. Nat. Hist., (7), I, p. 126, 1898. Sladen, Can. Ent., L, p. 302, 1918. Cockerell, Proc. Calif. Ac. Sci., XIV, p. 204, 1925. Mitchell, Trans. Am. Ent. Soc., LIV, p. 334, 1929. Mitchell, Trans, Am. Ent. Soc., LVI, p. 226, 1930.

Megachile latimanus grindeliarum Cockerell, Ent. News, xv, p. 33, 1904.

The triangular carinate mid metatarsal protuberance constitutes a ready means of recognizing the males of *perihirta*. The females, however, are practically indistinguishable from those of *latimanus* (see p. 131).

Female.—Size: Length 12-13 mm.; breadth of abdomen 4-4.5 mm; anterior wing 9 mm.

Structure: Face very slightly broader than long; eyes subparallel; clypeal margin straight, finely denticulate or crenulate; lateral ocelli very slightly nearer edge of vertex than to eyes, subequally distant from eyes and from each other; vertex flat; cheeks slightly broader than eyes.

Puncturation: Fine and close on cheeks, vertex medially, mesonotum except near center, scutellum, and pleura above; slightly more coarse on clypeus, close except for an indefinite median shining line; sparse on supraclypeal area; more coarse but close on pleura below; minute on abdomen, close basally, becoming slightly more distinct and more definitely separated to the fifth tergum, close and fine on the sixth.

Color: Black; antennae beneath and tegulae more reddish-piceous; wings subhyaline basally, faintly clouded apically, nervures piceous; spurs yellow

Pubescence: Whitish or pale ochraceous on head, thorax, legs and on the first two abdominal segments, but vertex with fuscous pubescence and mesonotum with a fuscous patch between tegulae; largely black on third to fifth abdominal terga, these with entire whitish or ochraceous apical fasciae, that on the second indefinite or widely interrupted, the sixth with erect ochraceous pubescence basally, with subappressed ochraceous pubescence apically; scopa entirely ochraceous, paler toward the base.

Male.—Size: Length 13 mm.; breadth of abdomen 4.5 mm.; anterior wing 9 mm.

Structure: Face slightly broader than long; eyes very slightly convergent below; clypeal margin irregularly crenulate medially; inferior margin of mandible straight between the apical tooth and the apex of the inferior projection; basal joint of flagellum very slightly longer than the pedicel, somewhat shorter than the second joint, the apical one very slightly dilated and flattened; lateral ocelli subequally distant from eyes, edge of vertex and each other; vertex flattened; cheeks broader than eyes; front coxal spines robust, moderately long, broad at base, gradually narrowed to the acute tips; front femur with keel of inferior margin obscured by the dense pubescence of the posterior face; front metatarsus subequal in length to second to fourth joints combined, slightly narrowed apically and only slightly produced at anterior apex; mid femur much swollen, the tibia lacking the usual apical spur, the metatarsus with a triangular carina-like protuberance beneath, which is narrowly rounded at the apex; hind tibia slightly curved, the metatarsus rounded on anterior margin; mesosternum with a short but rather robust carinate projection anterior to each mid coxa; abdomen short and broad, the third to fifth terga more or less distinctly depressed across apical margins, that of the second depressed only toward the sides; disc of sixth tergum vertical in position, the carina short, with a narrow but usually distinct median emargination, minutely crenulate on each side of this; seventh tergum produced medially into a short but definite triangularly pointed projection.

Sternites: Fifth medasternite much broader than the lateral portions of the presternite, with which it is contiguous (resembling *latimanus*); otherwise typical of *Xanthosarus* (see p. 120).

Genital armature: Typical of *Xanthosarus* (see p. 121).

Puncturation: Very close and fine over entire head and thorax; minute and close on abdomen basally, becoming more coarse and distinct, but still rather close to the fourth and fifth terga, very fine and close on the sixth.

Color: Black; antennae piceous; mandibles ferruginous along inferior margin; tegulae ferruginous in part; wings subhyaline, slightly clouded apically, the nervures piceous; front femur blackish over a large part of posterior face, otherwise ferruginous; front tibia ferruginous except for a dark stripe on the outer face, more yellowish apically; front tarsi yellow; mid and hind legs black; spurs yellow.

Pubescence: Entirely pale ochraceous over entire insect, with no dark admixture evident, the abdominal fasciae indefinite and obscure; front tarsal fringe whitish or pale ochraceous, more brownish beneath, especially at tip; mid tarsal fringe long and thin, entirely pale ochraceous.

Type.—Male; Colorado Springs, Colorado, (Ckll. 3571), [U. S. N. M., no. 9658].

Range. — Southern California and Mexico north to British Columbia, east to Alberta, Montana, Wyoming, Colorado and Texas, May to October. Definite records are as follows:

BRITISH COLUMBIA: 1♂, Field, July 1, 1906, (S. Brown). 1♂, Nicola, Aug. 3, 1923, (E. R. Buckell). 1♂, Pentecton, Sep. 3, 1919, (E. R. Buckell). 1♀, Summerland, July 20, 1917, (Sladen). 2♂, Vernon, Aug. 25, 1917, (Sladen). 1♂, Vernon, July 7, 1920, (N. L. Cutler). Identified also from Chilcotin, Glenora, Merritt, Okanagan Falls, Oliver and Victoria.

CALIFORNIA: 4♂, 20♀, no locality record. 1♂, (C. F. Baker). 1♂, Auburn, July 23, 1915, (L. Bruner). 2♂, 1♀, Burbank, July 23 and Aug. 9, 1929 and 1930, (Hicks). 1♀, G. Alpine Cr., Tahoe, July 9, 1915, (E. P. VanDuzee). 1♂, 1♀, Lake Tahoe, Aug. 21 & 22, 1916, (L. Bruner). 1♀, Los Angeles. 1♀, 2♂, Los Angeles, June 15 & 26, July 5, 1926, (Hicks). 1♂, 1♀, Los Angeles, July 28, 1929, (Hicks). 2♂, 2♀, Riverside, May 29, 1927, Sept. 14 & 25, 1926, and Oct. 14, 1925, (Timberlake). 1♂, 2♀, Sacramento, Sept. 27 and Oct. 3 & 6, 1916, (L. Bruner). 1♀, Yosemite, June 24, 1902. Identified also from Bakersfield (Aug.), Hollywood, Inverness, Jacumba (Aug.), Redlands, Stanford University and Warren.

Colorado: 1♂, 1♀, no locality record. 3♂, 33♀, Boulder County, June 18–Oct. 18, 1925, (C. P. Custer). 31♂, 24♀, Boulder County, May 23 to Sept. 27, 1925, (Hicks). 1♀, Boulder County, Sep. 13, 1933, (Hicks). 1♂, Creede, 8844 ft., Aug. 1914, (S. J. Hunter). 1♀, Denver, July 29. 1♀, near Denver, Aug., (Figgins). 1♀, Denver, July 25, 1915, (E. C. Jackson). 1♂, Electra Lake, June 28–July 1, 1919. 1♂, Leadville, Aug. 3–5, 1919. 1♂, Roger's Mesa, Hotchkiss, July 12, 1923, (L. O. Jackson; on *Asclepias galioides*). 2♂, 1♀, Ward, Aug. 10, (W. P. Cockerell). Identified also from Estes Park (July and Aug.), Grand Junction (July), Longs Peak Inn (July), Ouray (July), Pagosa Springs (June), Pingree Park (Aug.), Poncho Pass (June), Pueblo (Aug.), Ridgeway (July), Rifle (July) and Tennessee Pass (Aug.).

Idaho: 1♀, Moscow. 1♀, Fort Hall, near Blackfoot, July 21, 1934, (Louise Ireland). 2♂, 2♀, Twin Falls, Aug. 3, 1934, (H. A. Scullen). Identified also from Ashton (July), Bear Lake (July), Moscow (June), Troy and Weiser (June).

Montana: 1♂, no locality record. 1♂, Lake Ronan, Lake County, Aug. 18, 1932, (R. D. Eichman). Identified also from Beaver Creek (Aug.), Billings, Gallatin County, Helena, Pondera County and Powell County.

Nevada: 7♂, 7♀, no locality record.

New Mexico: 1♀, Beulah, June 29, 1902. 1♀, top of Las Vegas Range, June 28, 1902.

Oregon: 1♀, no locality record. 1♀, 4♂, Antelope Mt., Harney County, 6500 ft., July 16 and Aug. 7–15, 1931, (D. K. Frewing). 1♀, Banks, 3–4–11 (March or April, 1911 ?). 1♂, Breitenbush Hot Springs, 2222 ft., July 4, 1934, (H. A. Scullen). 1♀, Brookings, (G. R. McGinnis). 5♀, 4♂, Corvallis, July 20 to Aug. 27, (1♀ on *Circium lanceolatum*). 1♀, Harrisburg, Sept. 1899. 2♀, Independence, July 9, 1934, (N. P. Larson). 1♂, Lebanon, July 19, 1905, (Parsons). 1♀, Peters Butte, July 10, 1930, (Robert L. West). Identified in addition from Albany, Ashland, Baker County, Blodgett, Cascadia, Coos Bay, Cottage Grove, Creater Lake, Crescent City, Echo, Eugene, Forest Grove (Aug.), Grants Pass, Hot Lake, Junction City, Lava Lake, Monroe, Mt. Jefferson, Portland (June and Aug.), Salem, The Dalles, Three Sisters and Union.

Utah: 1♂, Ogden, July 25, 1920. 4♀, Ogden, Aug. 29 & 30, 1916. 5♂, 3♀, Salt Lake City, Aug. 24, 1917. Recorded also from Huntsville (July), Provo (July) and Stockton.

Vancouver: 1♂, 1♀, no locality record. 1♂, Livingston, Aug. 6, (or June 8), 1896.

WASHINGTON: 3♀, Wawawai, (C. V. Piper; lot 217). Identified also from Coulee City (Sept.), Nelson's, Olympia, Orcus Island, Pullman, San Juan Island, Seattle, Stratford (Sept.), Umatilla and Waldron Island.

WYOMING: 1♂, 1♀, Big Horn Basin, Aug. 13, 1910, (H. S. Smith). 1♂, Mts. near Sheridan, (Metz). Identified also from Bridge Basin and Stewart R. Sta.

Additional specimens of *perihirta* have been identified from the following localities: Alberta — Burdett, Calgary, Waterton Lakes; Mexico — Atzapolzalco; Nebraska—War Bonnet Canyon and West Point.

Flower records.—Melilotus officionalis, Cleome serrulata, yellow *Aster* sp., *Helianthus anuus, Circium lanceolatum, Trifolium involucratum, Epilobium angustifolium* and *Eriogonum* sp.

Subgenus **PHAENOSARUS** Mitchell

Phaenosarus Mitchell, Trans. Am. Ent. Soc., LIX, p. 303, 1934.

Tongue: Second joint of labial palpus slightly longer than the first; maxillary palpi bare, third joint longer and more slender than the others.

Female.—Mandible 5-dentate, emargination between the third and fourth teeth large and deep, the fourth tooth small, slender and oblique, a cutting edge between the third, fourth and fifth teeth, and a bare indication of one between the second and third; basal joint of flagellum slightly longer than the pedicel or the second joint, these subequal; mid and hind metatarsi about equalling their tibiae in width, and only slightly shorter; claws with robust basal setae which are tooth-like in appearance; abdomen broadly cordate; sixth tergum more or less triangular in dorsal aspect, with the sides straight or very slightly concave, the apex rounded or subtruncate, straight in profile, with basal erect hairs visible; sixth sternum only sparsely covered with scopal hairs, with a short dense apical fringe beyond which the tip of the plate is somewhat thickened and protuberant, but without a definite bare apical lip.

Male.—Mandible 3-dentate, with a robust basal obliquely truncate inferior projection; basal joint of flagellum slightly longer than pedicel, the second joint considerably longer, the apical one very broadly dilated and flattened; inferior angle of cheeks neither spined nor protuberant; front coxae largely bare anteriorly, each with a large patch of reddish bristles just anterior to the base of the robust but short spine; front femur slightly keeled beneath apically; front tarsi broadly dilated and flattened; mid tibia with the usual apical spur; claws without basal teeth; carina of sixth tergum triangular with trauncate apex, not at all emarginate although often irregularly denticulate or crenulate, apical margin of the tergum with robust carinate median teeth which are more distant from each other than from the obscure lateral angles; seventh tergum relatively robust, more or less protuberant or pointed medially.

Male sternites: Fourth sternum exposed; fifth presternite with separate lateral plates covered with plumose hairs, medially almost linear, the medasternite rather widely separated from the presternite basally and laterally, well covered with robust non-plumose setae which are abruptly dilated at the tips, the poststernal strip broadly incurved apically, overlapping the apical margin of the medasternite; lateral portions of sixth presternite robust, rounded and setose or pubescent apically, the medasternal areas distinct, well separated, extensive, their apical margins oblique, densely setose, the more apical and lateral of the setae rather abruptly dilated or spatulate at their tips, the poststernal lobe short, but the latero-apical angles produced into a pair of slender elongate lobes.

Genital armature: Stipites robust, gradually constricted above base, slightly sinuate, abruptly flexed ventrally just beyond middle, the flexed portion dilated and more or less compressed, with long conspicuous setae; sagittae more slender, relatively straight, not exceeding the stipites apically; volsellae small and inconspicuous.

GENOTYPE: *Megachile fortis* Cresson. [Orthotype.]

The females of this very restricted group bear a close superficial resemblance to the females of *Xanthosarus*, chiefly through the similarity in dentition of the mandibles. The characteristics of the males however would indicate a closer affinity to *Xeromegachile*, and it is possible that convergence is responsible for the apparent affinity of the females to *Xanthosarus*.

Hicks[4] has observed *fortis* nesting in the ground, constructing cells of leaves from some undetermined plant.

Key to Species of Phaenosarus

Females

1. Vertex, mesonotum, and discs of abdominal terga with considerable black pubescence .... *agustina* Cockerell
   Vertex, dorsum of thorax, and abdomen with entirely fulvo-ochraceous pubescence .... *fortis* Cresson

Males

1. Inferior mandibular projection very broad, truncated, with a sharp anterior as well as an inferior angle (Pl. VIII) .... *fortis* Cresson
   Inferior mandibular projection slender and elongate (Pl. VIII, *agustini*) 2
2. Carina of sixth tergum quite evenly rounded, slightly elevated medially, but not ridged, the surface not at all obscured, and the punctures very fine and densely crowded .... *subfortis* new species
   Carina of sixth tergum truncate apically, with a quite prominent median ridge, the sculpturing coarse and irregular, the base largely obscured by appressed tomentum .... *agustini* Cockerell

Megachile (Phaenosarus) agustini Cockerell (Pl. VIII.)

Megachile agustini Cockerell, Ent. News, xvi, p. 82, 1905.

Due to the variability in color of pubescence, the females of *agustini* are sometimes difficult to separate from *fortis*. When these color characters fail to establish identity, recourse may be had to the range as a means of determination, for *agustini* apparently extends westward from the continental divide, whereas *fortis* occurs principally east of the divide, centering in Kansas and Iowa.

The males of these two forms are quite distinct, with no intergrades between them thus far observed.

Female.—Size: Length 14–16 mm.; breadth of abdomen 5–5.5 mm; anterior wing 10.5–11 mm.

Structure: Face broader than long; eyes subparallel; clypeal margin nearly straight, with at most a few shallow irregularities or crenulations; lateral ocelli subequally distant from eyes, edge of vertex, and from each other; vertex nearly flat; cheeks slightly broader than eyes; second to fourth abdominal terga slightly depressed basally, apical margins of the third to the fifth quite distinctly depressed over entire width.

Puncturation: Close and rather fine on cheeks, vertex medially, and over most of thorax, somewhat more coarse and distinct on vertex laterally and mesonotum medially; more coarse but close on pleura below, close over most of clypeus, but more distinct and coarse below; very fine and close on abdomen basally, becoming more coarse and distinctly separated to fifth tergum, but very fine and close on the sixth.

Color: Black; antennae piceous beneath; tegulae more reddish; wings very lightly infuscated or subhyaline, slightly darker apically, the nervures piceous; spurs yellowish-ferruginous.

Pubescence: Whitish or creamy over most of head, thorax, legs and basal segments of abdomen, but vertex, mesonotum, scutellum and second abdominal tergum with varying amounts of intermixed fuscous hairs (in some specimens the vertex and mesonotum are largely fuscous pubescent); third to fifth abdominal terga with conspicuous blackish pubescence; entirely pale on the sixth, or with at most a few dark erect hairs basally, and with appressed pale tomentum apically which becomes brownish at extreme tip in some specimens; first to fifth terga with entire pale ochraceous or creamy apical fasciae, that on the first very thin, but the more apical ones dense and conspicuous; scopa white, more fulvous on sixth sternum, with a few dark hairs on the sixth and sometimes on the fifth laterally.

Male.—Size: Length 13–14 mm.; breadth of abdomen 4.5–5 mm.; anterior wing 9–9.5 mm.

Structure: Face with length and breadth subequal; eyes subparallel; clypeal margin practically straight and entire; inferior projection of mandible relatively narrow and slender, the oblique truncation at tip very short; lateral ocelli nearer eyes than to edge of vertex, subequally distant from each other and from eyes; vertex nearly flat; cheeks subequal in width to eyes; front metatarsus subequal in length to second to fourth joints combined, broadly dilated, the margins subparallel, the anterior margin only slightly excavated and only slightly produced apically; mid and hind metatarsi relatively slender, much longer than broad; second and third abdominal terga considerably depressed basally, apical margins of the second to the fifth quite deeply depressed, especially laterally and on the more apical terga; carina of sixth tergum subtruncate apically, with more or less marked denticulations or crenulations, the disc basad of the carina flattened on each side of a rather conspicuous median ridge; seventh tergum more or less triangularly pointed medially.

Sternites: Typical of *Phaenosarus* and very similar to those of *fortis* (see Pl. IX) except that the separate lateral plates of the fifth presternite are relatively smaller, not being produced toward the center and base as in *fortis*.

Genital armature: Typical of *Phaenosarus* and very similar to that in *fortis* (see Pl. IX) except that stipites are more definitely compressed apically, the compressed portion being flexed ventrally, with the tips curved inwardly, the resulting broadened concave inner surface densely covered with long setae.

Puncturation: Fine and close over most of head and thorax, though slightly more coarse and distinct on the vertex laterally; very fine and close on abdomen basally, becoming more coarse and distinct, but not very sparse, to the fifth tergum, rather shallow, but coarse and close on the sixth.

Color: Black; antennae blackish; tegulae piceous or dark ferruginous; wings subhyaline basally, more clouded apically, the nervures piceous; front coxae and trochanters dark; front femur dark on upper portion of posterior face, otherwise mostly ferruginous; front tibia dark over most of outer face, but this ferruginous apically, and the other two faces largely ferruginous; front tarsi yellow, second joint with a dark spot beneath; mid and hind legs black; spurs yellowish-ferruginous.

Pubescence: Entirely pale ochraceous or fulvous, with hardly any dark admixture, (a slight amount of dark pubescence occurs on the discs of the abdominal terga in some specimens); abdominal fasciae dense and consequently conspicuous, even though there is but little contrast in color to that of the discs; metatarsal fringes whitish or pale ochraceous, brownish beneath on front tarsi.

Type.—Male, Pecos, Aug. 30, (Cockerell), [Cockerell].

Range.—Utah, Colorado, Arizona and New Mexico, June, July, and August. Definite records are as follows:

ARIZONA: 1♂, S. Arizona, Aug. 1902, (F. H. Snow), (Cornell U. Lot 546, 1♀, Baboquivari Mts. Schaeffer Canyon and above, (Sub. 762, Baker Coll., labelled *Megachile angustini*), Sept. 19, 1924, (Hebard). Identified also from Oak Creek Canyon (Aug.) and Palmerlee.

COLORADO: 19♂, 5♀, no data. 3♂, Boulder, July 19 & 21, 1926, (Hicks). 3♂, Boulder, July 12 & 27, 1925, (C. P. Custer). 2♂, Boulder, July 2 & 13, (1 on *Helianthus anuus;* Cockerell). 1♀, Boulder, Aug. 7–12, 1919, about 40°, 0′, N. 105°, 15′, W., 5500 ft., (Am. Mus. Nat. Hist., F. 4405A). 1♀, Boulder, July 29, 1922, about 5500 ft., (Am. Mus. Nat. Hist., F. 4793A). 4♂, Fort Collins, July 17, 1900 and July 16, 1903. 2♂, Fort Collins, July 29, 1903, (L. A. Titus). 1♂, 1♀, La Junta, Aug. 12, 1920, about 37°, 59′, N. 103°, 31′, W., 4100 ft. alt., (Am. Mus. Nat. Hist., F. 4762A). 1♀, Livermore, July 15, 1900. Recorded also from Fort Garland, La Veta and Mesa Verde (July).

NEW MEXICO: 1♂, Fort Wingate, July 18, 1909, (Woodgate). 1♀, Springer, 8.28, (C. N. Ainslie). Also identified from Koehler (Aug.).

UTAH: 2♂, 1♀, Dividend, Aug. 17 & Sept. 2, (Tom. Spalding). 1♀, Indianola (Vasco M. Tanner). Identified also from Logan (Aug.).

Megachile (Phaenosarus) fortis Cresson (Pls. VIII and IX.)

Megachile fortis Cresson, Trans. Am. Ent. Soc., IV, p. 262, 1872. Cresson, Mem. Am. Ent. Soc., I, p. 118, 1916.

Megachile emoryi Cockerell, Entomologist, XXXVII, p. 7, 1904. Cockerell, Ann. Mag. Nat. Hist., (8), I, p. 259, 1908.

Megachile fortis var. *vestali* Cockerell, Ann. Mag. Nat. Hist., (8), XI, p. 530, 1913. Cockerell, Ann. Mag. Nat. Hist., (9), XI, p. 263, 1923. Hicks, Univ. Colo. Stud., (15), III, p. 229, 1926.

Female—Size: Length 16–18 mm.; breadth of abdomen 6 mm.; anterior wing 11–12 mm.

Structure: Face broader than long; eyes subparallel; clypeal margin with small irregular crenulations; lateral ocelli subequally distant from eyes, edge of vertex, and from each other; vertex nearly flat; cheeks somewhat broader than eyes; second and third abdominal terga with rather deep basal grooves or depressions, apical margins of the third to the fifth distinctly depressed laterally but only slightly so medially.

Puncturation: Universally fine and close over entire insect, with but the following exceptions; more coarse and distinct on the lower portion of clypeus; more distinct but fine and quite close on vertex laterally; slightly more coarse and distinct on fourth abdominal tergum, and still more so on the fifth.

Color: Black; antennae obscurely piceous; tegulae dark ferruginous to piceous; wings lightly infuscated, slightly more deeply so apically, the nervures piceous; spurs rather dark ferruginous.

Pubescence: Entirely ochraceous or pale fulvous, the abdominal terga with entire and conspicuous ochraceous apical fasciae, the pubescence of the discs being more distinctly fulvous, the sixth tergum with appressed ochraceous tomentum, with scattered erect ochraceous hairs across the base, the tomentum at the tip being more fulvous; scopa entirely ochraceous or pale fulvous.

Male.—Size: Length 14–15 mm.; breadth of abdomen 5–5.5 mm.; anterior wing 10–11 mm.

Structure: Face very slightly broader than long; eyes subparallel; clypeal margin very nearly straight, with minute median crenulations or irregularities; inferior projection of mandible very broad, the truncate apex equal to one-third the length of the mandible; the lateral ocelli considerably nearer the eyes than to edge of vertex, subequally distant from eyes and each other; vertex nearly flat; cheeks broader than eyes; front metatarsus broadly dilated, parallel-sided, anterior margin only very slightly excavated and very slightly produced apically, the second, third, and fourth joints short; third to fifth abdominal terga deeply depressed across apical margins, especially laterally, the margin of the second depressed laterally but not medially, the second and third rather deeply depressed basally; carina of sixth tergum truncate apically, slightly crenulate on each side of the truncation, the surface basad of the carina flattened on each side of a rather conspicuous median ridge; seventh tergum more or less triangularly pointed.

Sternites: Typical of *Phaenosarus* (see p. 140), with the separate lateral plates of the fifth presternite relatively extensive, being considerably produced toward the base and center. (See Pl. IX.)

Genital armature: Typical of *Phaenosarus*, with the stipites robust and but slightly compressed apically, the tips ventrally flexed and dilated. (See Pl. IX.)

Puncturation: Fine and close over entire head and thorax; minute and close on abdomen basally, becoming more coarse and distinct to the fifth tergum, although not sparse, shallow and rather coarse and close on the sixth.

Color: Black; antennae piceous beneath; tegulae dark ferruginous, more yellowish anteriorly; wings subhyaline or faintly infuscated basally, more clouded apically, the nervures piceous; front coxae dark, the trochanters, femur, and tibia largely ferruginous, but the femur dark on posterior face and the tibia on the outer face; front tarsi ivory-yellow, the second joint blackened beneath posteriorly; mid and hind legs black, the spurs yellow-ferruginous.

Pubescence: Entirely ochraceous or fulvous, with no dark admixture, the apical abdominal fasciae dense and consequently conspicuous, though not contrasting to any degree with the pubescence of the discs; front and mid tarsal fringes largely ochraceous or fulvous, front tarsi otherwise covered with silvery pubescence.

Type.—Male; Texas, [A. N. S. P., no. 2453].

Range.—South Dakota and Iowa, south and west to Colorado and New Mexico, July, August and September. Definite records are as follows:

COLORADO: 5♂, no data. 2♂, 2♀, Wray, Aug. 17-19, 1919, about 40°, 0′, N., 102°, 10′, W., 3700 ft., (F. 4412 A & C Am. Mus. Nat. Hist.). Identified also from Boulder (July—on *Helianthus*).

IOWA: 1♂, 1♀, Sioux City, Aug. 5 & 21, 1926, (C. N. Ainslie).

KANSAS: 1♂, no locality record. 1♂, 1♀, Anderson County, (R. H. Beamer, 1047, 15). 1♂, Norton County, 2270 ft., Aug. 23, 1912, (F. X. Williams). Identified also from Baldwin, Blue Rapids (Sep. on *Helianthus*), Clay County, Dickinson County, Franklin County, Osborn County and Phillips County (Aug.).

LOUISIANA: 1♂, New Orleans, (Shufeldt; from Dept. Agriculture).

NEBRASKA: 1♀, West Nebraska, Aug. 6, 1934, (H. A. Scullen). 1♂, Glen, Sioux County, 4,000 ft., Aug. 17, 1906, (H. S. Smith). 1♂, Gordon, Sheridan County, Aug. 27, 1905. 1♂, 1♀, Halsey, July 29 and Aug. 5, 1912, (on *Helianthus petiolaris;* J. T. Zimmer). 12♂, 12♀, Halsey, Aug. 9–16 and Sept. 1, 1925, (R. W. Dawson). 3♀, Lincoln, Sep. 1♂, Lincoln, Aug. 9, 1914, (on *Dicrophyllum marginatum;* E. G. Anderson). 1♂, Louisville, Aug. 3, 1914, (on *Vernonia fasciculata;* E. G. Anderson). 1♂, Louisville, Aug. 1, 1914, (H. A. Jones). 2♂, McCook, Aug. 9, 1901, (on *Helianthus;* M. A. Carriker, Jr.). 1♀, West Point, Aug. 15, 1903, (on *Helianthus;* J. C. Crawford, no. 2237). Identified also from Child's Point, Crawford, Mitchell, Monroe Canyon, Nebraska City, Neligh and Omaha.

Other specimens of *fortis* have been identified from New Mexico—Torrence County (Sept.); and South Dakota—Elk Point.

Flower records.—Silphium integrafolium, Helianthus subrhomboidens, H. petiolaris, Solidago canadensis, Vernonia fasciculata, Dicrophyllum marginatum.

Megachile (Phaenosarus) subfortis new species

That this is a valid species is not entirely certain, since the condition of the antennae indicates the possibility that the unique specimen is abnormal. In both antennae, the second joint of the flagellum is partially divided, resulting in an approach to a 14-jointed condition.

It most closely resembles *agustini*, differing in the much more closely and finely punctate apical segments of the abdomen; in the more evenly rounded carina of the sixth segment together with the lack of any median ridge on this segment, and in the more uniformly black posterior face of the front femur. The hidden sterna also seem to be somewhat different from either *fortis* or *agustini* in the wider separation of the fifth medasternite from the median portion of its presternite, and in the smaller relative size of the medasternal areas of the sixth sternum.

Male.—Size: Length 11.5 mm.; breadth of abdomen 4 mm.; anterior wing 8 mm.

Structure: Face longer than broad; eyes slightly convergent below; clypeal margin very slightly incurved medially; mandibles tridentate, the inferior projection subbasal, long and rather slender (similar to *agustini,* Pl. VIII); first joint of flagellum slightly longer than pedicel, considerably shorter than the second joint which is abnormal, being partially divided, the apical joint dilated and flattened; lateral ocelli slightly nearer eyes than to edge of vertex; vertex nearly flat; cheeks slightly narrower than eyes; front coxae bare anteriorly, with moderately robust and acute spines, a patch of ferruginous bristles located just antero-laterad of the base of each spine; front metatarsus subequal in length to second to fourth joints combined, flattened, dilated to about the width of the tibia, only slightly produced apically. the anterior margin narrowly excavated; mid and hind metatarsi definitely narrower than their tibiae; apical margins of the second to fourth abdominal terga distinctly depressed across entire width, more so laterally and on the more apical segments, the fourth and fifth impressed on each side medially; carina of sixth tergum rather irregularly rounded, the disc without a median ridge; seventh tergum broad, with a low triangular median protuberance.

Sternites: Fifth sternum typical of *Phaenosarus,* differing from *fortis* (Pl. IX) chiefly in the wider separation of the medasternite from the linear median portion of the presternite; sixth sternum also typical of *Phaenosarus,* differing from *fortis* in that the medasternal areas are much less extensive, are more distinctly transverse (rather than oblique as in *fortis*) and are less distinctly delimited basally; eighth sternum relatively longer and narrower than in *fortis.*

Genital armature: Quite similar to *fortis,* but the stipites much more compressed apically, the tips flexed ventrally and inwardly as in *agustini,* differing from both of these species in that the sagittae slightly exceed the stipites in length.

Puncturation: Fine and close over entire head, thorax and abdomen, being especially fine and close on the abdomen apically.

Color: Black; antennae beneath black or piceous; tegulae more ferruginous; wings subhyaline, slightly clouded apically, the nervures ferruginous to piceous; front coxae and trochanters black; front femur black on posterior face except for the margin of the keel, largely polished ferruginous on the other two faces; front tibia black on outer face, the apex yellow, the two inner faces polished ferruginous; front tarsi entirely yellow except for a black spot on second joint beneath; mid and hind legs black; spurs yellow.

Pubescence: Entirely pale ochraceous except for a few short dark hairs on the fourth and fifth abdominal segments; abdominal fasciae whitish, dense and entire on segments two to five; front tarsal fringe white on outer surface, golden brownish beneath.

Type.—Male; Douglas, Arizona, Aug. 20, 1933, (W. W. Jones). [Timberlake].

Subgenus **MEGACHILOIDES** Mitchell

Megachiloides Mitchell, Journ. Elisha Mitchell Soc., XL, p. 154, 1924. Mitchell, Trans. Am. Ent. Soc., LIX, p. 301, 1934.

Tongue.—Second joint of labial palpus considerably longer than the first (varying from 1.7 to 4 times the first in different species); maxillary palpi 3-jointed, not noticeably pubescent.

Female.—Mandible 3-dentate, but with a slight indication of a tooth between the two distinct inner teeth, a cutting edge extending from this vestigeal tooth to the inner angle; basal joint of flagellum at least slightly longer than pedicel, usually slightly longer than the second joint; metatarsi considerably shorter and narrower than their tibiae; abdomen cordate or ovoid, the sixth tergum usually nearly straight in profile, sixth sternum densely covered with short scopal hairs, with no indication of a bare apical lip.

Male.—Mandible 3-dentate, the middle tooth about equidistant from the other two, with a relatively narrow and acute subbasal inferior projection; basal joint of flagellum subequal to pedicel, the second joint usually somewhat longer, the apical one not much dilated; front coxae with rather small and slender subacute spines; inferior margin of front femur more or less keel-like apically; front metatarsi somewhat dilated, broadly and deeply excavated anteriorly; mid tibia with the usual apical spur; sixth tergum with an entire, more or less triangular carina, the median teeth of the apical margin carinate and at least slightly nearer the vestigeal lateral teeth than to each other; seventh tergum relatively robust, triangularly pointed medially.

Male sternites: Fourth sternum exposed; fifth presternite usually with quite extensive and distinctly delimited apical pubescent plates on each side, the medasternite densely covered with modified and dilated setae, the poststernal strip distinct; medasternal areas of sixth sternum definitely separated, restricted in area, usually linear laterally, well covered with setae toward the center, the poststernal lobe broad and extensive.

Genital armature: Stipites usually robust apically and somewhat constricted above base, the tips more or less modified and setose; sagittae slightly exceeding the stipites in length.

GENOTYPE: *Megachiloides oenotherae* Mitchell. [Haplotype.]

Specimens of this group are found but rarely in collections, even in the female sex, and it is quite possibly due to the difficulty in catching them. *M. oenotherae* is the only species with which the author is familiar in the field, and that species is not only exceedingly swift in flight, taking alarm readily, but it visits only one flower species and has a very short flight period in consequence. Thus its absence from collections may be easily understood, even though it is fairly abundant in given localities at certain seasons. It seems quite probable, therefore, that there are other species as yet unknown awaiting discovery.

Key to Species of Megachiloides

Females

1. Tongue relatively short, second joint of labial palpus less than twice the length of the first ....*amica* Cresson
   Second joint of labial palpus fully three times the length of the first, or more 2
2. Larger (13 mm.); pubescence on mesonotum entirely pale; western. *umatillensis* Mitchell
   Smaller (11 mm.); mesonotum and scutellum with much black pubescence; eastern ....*oenotherae* Mitchell

Males

1. Front metatarsi blackish; mesonotum and scutellum with much black pubescence; eastern ....*oenotherae* Mitchell
   Front metatarsi yellowish; mesonotum and scutellum with very little dark pubescence, if any; western 2
2. Smaller (9–10 mm.); fourth and fifth terga with short black pubescence ....*amica* Cresson
   Larger (13 mm.); fourth and fifth terga with largely pale pubescence. *umatillensis* Mitchell

Megachile (Megachiloides) amica Cresson (Pls. VIII and X.)

Megachile amica Cresson, Trans. Am. Ent. Soc., IV, p. 265, 1872. Friese, Das Tierr., Lfg. 28, Apidae, I, p. 234, 1911. Cockerell, Ann. Mag. Nat. Hist., (8), XV, p. 531, 1915. Cresson, Mem. Am. Ent. Soc., I, p. 111, 1916. Mitchell, Trans. Am. Ent. Soc., LII, p 115, 1926.

Female.—Size: Length 12 mm.; breadth of abdomen 4 mm.; anterior wing 8 mm.

Structure: Face about as broad as long; eyes subparallel; clypeal margin entire, straight medially; mandible 3-dentate, a vestige of a tooth just posterior to the middle one, (the cutting edge shorter than in *oenotherae*);

second joint of labial palpus nearly twice the length of the first; basal joint of flagellum slightly longer than pedicel, the second joint subequal to the pedicel or very slightly shorter; lateral ocelli subequally distant from eyes and edge of vertex; vertex flat; cheeks slightly broader than eyes; hind metatarsi distinctly shorter and narrower than their tibiae; abdomen more cordate, the second to fourth terga considerably but gradually depressed basally, apical margins of the second to the fifth abruptly depressed, deeply so laterally; sixth tergum triangular in dorsal aspect, the sides nearly straight and the apex subtruncate, straight in profile with visible erect pubescence.

Puncturation: Fine and close over most of head, but more coarse and distinct on clypeus below, more shallow and indistinct on cheeks below, and definitely but not widely separated on vertex laterally; minute and close on scutellum, somewhat more coarse and more widely separated on mesonotum, but the surface between them tessellated and dull, fine and close on pleura above, becoming more coarse and separate below; minute and close on abdomen basally, becoming more coarse and distinct, but still close, to the fifth tergum, deep, but close and rather fine on the sixth

Color: Black; antennae reddish-piceous beneath; tegulae branzy-ferruginous; wings subhyaline, slightly clouded apically, the nervures ferruginous to piceous; spurs yellow.

Pubescence: White on head, thorax, legs and first two abdominal segments, with a small amount of short brownish-fuscous pubescence on vertex and to a less extent in center of mesonotum; black on third to sixth abdominal terga, with a slight amount of paler tomentum on the sixth apically; (apical fasciae of the terga obscure in the single specimen at hand, but evidently entire and whitish); scopa white, short and black on the sixth sternum.

Male.—Size: length 10 mm.; breadth of abdomen 4 mm.; anterior wing 7.5 mm.

Structure: Face about as long as broad; eyes very slightly convergent below; clypeal margin straight and entire; mandible 3-dentate, the inferior projection subbasal, acute, relatively slender; second joint of labial palpus about one and a half times the length of the first; basal joint of flagellum very slightly longer than pedicel, the second joint considerably longer, the apical one slightly dilated and flattened; lateral ocelli subequally distant from eyes and edge of vertex; vertex nearly flat; cheeks subequal to eyes in width; front coxae largely bare anteriorly, each with a small and obscure patch of reddish bristles at the base of the rather short subacute spine; front femur carinate on lower margin apically; front tarsi dilated but hardly equalling their tibiae in width, the metatarsus not much exceeding the second and third joints combined, broadly and quite deeply excavated anteriorly, but only slightly produced apically; second and third abdominal terga somewhat depressed basally, the apical margins of the second to the fifth abruptly and quite deeply depressed except medially on the more basal segments; carina of sixth tergum broadly triangular, otherwise nearly entire, the carinate median teeth of the apical margin of the tergum considerably nearer the small lateral teeth than to each other; seventh tergum robust, acutely triangularly pointed medially.

Sternites: Apical plates of fifth presternite arcuate, the inner end much narrowed, well covered with fine pubescence, lateral portions of the presternite long and narrow, connected by a long linear median portion, the fifth medasternite deeply incised medially, almost divided into two parts, densely covered with setae which are dilated and pectinate apically, the poststernal strip broadly incurved, conspicuous laterally but not medially; lateral portions of sixth presternite obliquely truncate apically, much narrowed basally, the medasternal areas widely separated and heavily sclerotized, bearing long slender setae, the poststernal lobe extensive, slightly broader than long, the lateral angles rounded and produced.

Genital armature: Stipites sinuate, obliquely compressed and somewhat dilated apically, the ventral apical angle produced into an acute lobate projection, the dorsal surface just before the apex well covered with setae; sagittae relatively straight, slightly exceeding the stipites; volsellae triangular, with narrowly rounded tips.

Puncturation: Fine and close over most of head and thorax, but well separated between eyes and lateral ocelli and on mesonotum medially, the surface of the latter tessellate and dull between the punctures; minute and crowded on abdomen basally, becoming more coarse and distinct, although close, to the fifth tergum, more close on the sixth.

Color: Black; antennae dark ferruginous beneath; tegulae yellowish-ferruginous; wings subhyaline, faintly clouded apically, the nervures ferruginous; front femur dark on posterior face, polished ferruginous on the other two faces, but tinged with yellowish on the anterior one; front tibia yellow apically, otherwise dark on outer face, polished ferruginous on the other two, but the anterior one slightly darker; front tarsi yellow, the posterior margin beneath piceous; spurs yellow.

Pubescence: Whitish-ochraceous on head, thorax, legs and first three abdominal terga, with no evident dark admixture; fourth and fifth terga with very short dark pubescence, but that on the sixth entirely pale; second to fifth terga with whitish apical fasciae, entire at least on the more apical segments; front tarsal fringes fuscous beneath, those on the mid tarsi longer and entirely pale.

Type.—Male; Texas, [A. N. S. P., no. 2465].

Range.—The records of the few specimens other than the type which have been examined are as follows: 1 ♂, Austin, Texas, [W. M. Wheeler]; 1 ♀, SanDiego, Texas, (J. D. Mitchell), [U. S. N. M.]; 1 ♂, Bexar County, Texas, April 9, 1931, (H. B. Parks). A specimen has also been identified from Clark County, Kansas, (June).

Flower records.—None of the above specimens bore flower records. However, Cockerell records the male from *Verbesina enceloides* and *Opuntia*, and the female on *Monarda punctata* and *Anogra pallida.*

Megachile (Megachiloides) oenotherae Mitchell (Pls. VIII and X.)

Megachiloides oenotherae Mitchell, Journ. Elisha Mitchell Soc., XL, p. 154, 1924. Mitchell, Trans. Am. Ent. Soc., LII, p. 118, 1926. Mitchell, Psyche, XXXIV, p. 121, 1927.

Female.—Size: Length 11 mm.; breadth of abdomen 4 mm.; anterior wing 7.5 mm.

Structure: Face slightly broader above than long; eyes subparallel; clypeal margin straight, but with a minute indentation on each side; mandible 3-dentate, but with a slight indication of a tooth just posterior to the middle tooth; second joint of labial palpus about three and a half times as long as the first; basal joint of flagellum slightly longer than pedicel, the second joint shorter than the pedicel; lateral ocelli very slightly nearer edge of vertex than to eyes; vertex slightly convex; cheeks subequal to eyes in width; hind metatarsi definitely shorter and much narrower than their tibiae; abdomen ovoid, the third tergum rather deeply depressed basally, the others much less so, the apical margins of the third to the fifth quite abruptly depressed, especially laterally; sixth tergum broadly triangular in dorsal aspect, the apex truncate, slightly concave in profile with visible erect hairs.

Puncturation: Fine and close on cheeks above, over most of vertex, supraclypeal area, scutellum and pleura; becoming more coarse and quite sparse on cheeks below; distinctly separated on vertex laterally, below anterior ocellus, and on mesonotum medially; somewhat more coarse but very close on clypeus; minute and dense on abdomen basally, becoming quite coarse and distinct, but rather close, to the fifth tergum, deep but fine and close on the sixth.

Color: Black, including antennae and legs; tegulae reddish-piceous; wings subhyaline, slightly clouded apically, the nervures ferruginous to piceous; spurs yellow.

Pubescence: White on face, cheeks, pleura, propodeum, legs and basal abdominal terga; blackish on vertex, mesonotum medially, scutellum, and second to sixth terga, the sixth with no conspicuous pale tomentum; second to fifth terga with entire but rather thin white apical fasciae, with an indistinct one on the first; scopa white, short and black on the sixth sternum.

Male.—Size: Length 9 mm.; breadth of abdomen 3 mm.; anterior wing 6.5 mm.

Structure: Face very slightly broader above than long; eyes subparallel; clypeal margin straight and entire; mandible 3-dentate, the inferior projection subbasal and acute; second joint of labial palpus four times the length of the first; basal joint of flagellum just perceptibly longer than either the pedicel or the second joint, the apical one neither dilated nor flattened; lateral ocelli subequally distant from eyes and edge of vertex; vertex nearly flat; cheeks slightly broader than eyes; front coxae bare anteriorly, the spines rather slender and acute, a small obscure patch of ferruginous bristles at the base of each spine; lower margin of front femur keeled on apical two-thirds; front tarsi dilated, the metatarsus subequal to the tibia in width, and subequal in length to the second and third combined, with a broad but shallow excavation on the anterior margin; hind metatarsi rather slender, about two and a half times longer than broad; second and third abdominal terga rather deeply depressed basally, the apical margins of the third to the fifth deeply depressed, especially laterally; carina of sixth tergum triangular in outline, the disc with a slight central protuberance, the carinate median teeth of the apical margin slightly nearer the vestigeal lateral teeth than to each other; seventh tergum robust, produced medially into a triangular acute projection.

Sternites: Apical plates of fifth presternite ovoid and pubescent, occupying about a third of the area of this sclerite which is linear medially, the fifth medasternite almost divided medially, each resulting half ovoid, densely covered with robust, apically dilated setae, the poststernal strip incurved medially, quite conspicuous laterally; lateral portions of sixth presternite elongate, obliquely truncate apically, the medasternal areas quite widely separated medially, the inner portion of each more extensive and covered with fine apically flexed setae, the outer portion of each reduced to a linear carinate curved line, poststernal lobe extensive, considerably broader than long, incurved medially, the lateral angles slightly produced.

Genital armature: Stipites slightly sinuate, the apices obliquely compressed and slightly dilated, the dorsal surface well covered with short setae; sagittae relatively straight, slightly exceeding the stipites in length; volsellae more or less rounded.

Puncturation: Fine on head and thorax, very close on cheeks and pleura, more distinctly separated on vertex, mesonotum and scutellum, rather widely so on the vertex laterally and on mesonotum and scutellum medially; minute and close on abdomen basally, becoming more coarse, distinct and definitely separated, though not sparse, to the fifth tergum, more close on the sixth.

Color: Black; antennae reddish-piceous beneath; tegulae reddish-piceous; wings subhyaline, slightly darker apically, the nervures dark ferruginous to piceous; front legs largely dark, polished dark ferruginous on anterior face of femur and posterior face of tibia, the metatarsus and fifth tarsal joint dark, second to fourth joints yellowish in large parts; spurs pale yellow.

Pubescence: White on face, cheeks, pleura, propodeum, and largely so on legs and basal abdominal terga; fuscous on vertex, mesonotum, scutellum, and second to fifth abdominal terga, with a few darker hairs on front tibiae;

tarsal fringes entirely white; first to fifth terga with white apical fasciae, those on the more apical terga at least, entire.

Type. — Female; Raleigh, North Carolina, May 18, 1922, (Mitchell; on *Oenothera*), [U. S. N. M., no. 28350].

Allotype. — Male; Raleigh, North Carolina, May 18, 1922, (Mitchell; on *Pentstemon*), [U. S. N. M.].

Range.—New Jersey, along the coast to Texas and Oklahoma, April, May and June. Definite records are as follows:

NEW JERSEY: 4♂, 3♀, Cape May, June 5, 1903, [A.N.S.P.].

NORTH CAROLINA: 3♂, Carolina Beach, May 19, 1934, on *Oenothera*. 4♂, 4♀, (paratypes), Raleigh, May 13–27, June 7, 1922, on *Oenothera*. 1♂, 1♀, (paratypes), Raleigh, May 15, 1922, on *Pentstemon* (♀ without pollen in scopa). 1♂, Raleigh, May 20, 1933, on *Pentstemon*. 3♂, 4♀, Raleigh, May 7–25, June 18, on *Oenothera*. 1♀, Raleigh, May 20, 1933, cutting petals of *Oenothera;* (all Mitchell); [all Mitchell]. Recorded also from New Bern and Southern Pines.

TEXAS: 3♂, 1♀, no locality record. Identified from Dallas, Edna, and Lee County (April).

Specimens of *oenotherae* have been identified from Shawnee, Okla. April 23, 1916, (on *Meriolex drummondiana*).

Flower records. — All North Carolina records on *Oenothera laciniata*, although one male has been captured on *Ceanothus americanus*, and one on *Pentstemon* sp. A female from Oklahoma is recorded as captured on *Meriolex drummondiana*, but it has very little pollen in the scopa.

Megachile (Megachiloides) umatillensis Mitchell (Pls. VIII and X.)

Megachiloides umatillensis Mitchell, Psyche, XXXIV, p. 118, 1927.

Female.—Size: Length 14 mm.; breadth of abdomen 5 mm.; anterior wing 9 mm.

Structure: Face about as long as broad; eyes subparallel; clypeal margin quite evenly outcurved, entire, with a slightly produced impunctate median area; mandible inconspicuously 4-dentate, the third tooth approximate to the second and very small, a cutting edge between it and the fourth; second joint of labial palpus fully three times the length of the first; second joint of flagellum subequal to pedicel, the first joint longer; lateral ocelli subequally distant from eyes and edge of vertex; vertex flat; cheeks slightly broader than eyes; hind metatarsi about two-thirds as long and broad as their tibiae; second to fourth abdominal terga somewhat depressed basally, the apical margins of the second to the fifth depressed toward sides but only very slightly so medially on the more apical terga; sixth tergum slightly concave at sides in dorsal aspect, straight in profile with scattered erect hairs visible toward the base.

Puncturation: Fine and quite close on cheeks behind eyes, face above, vertex medially, pleura above, and over most of mesonotum and scutellum; more coarse and distinct but hardly sparse on vertex laterally, mesonotum medially, and pleura below; more coarse and deep on cheeks below and behind; deep, but rather fine and close over most of clypeus, more coarse toward the apical margin; minute and densely crowded on abdomen basally, becoming more distinct but still fine and close apically, very close on the sixth tergum.

Color: Black; antennae beneath and tegulae deep ferruginous; wings subhyaline, faintly clouded apically, the nervures ferruginous; spurs fuscous.

Pubescence: Mostly pale ochraceous above, dense on dorsum of thorax, becoming more whitish below and on face, with a few intermixed dark hairs on vertex laterally and on the fourth and fifth terga; second to fifth terga with entire whitish apical fasciae, thin medially on the second, dense on the others; scopa white, but entirely fuscous on the sixth sternum.

Male.—Size: Length 13 mm.; breadth of abdomen 5 mm.; anterior wing 10 mm.

Structure: Face slightly longer than broad above; eyes slightly convergent below; clypeal margin nearly straight and entire, with a very slight emargination at each extreme side; mandible 3-dentate, the inferior projection subbasal, relatively slender and acute; second joint of labial palpus nearly three times as long as the first; basal joint of flagellum slightly longer than pedicel, but slightly shorter than the second joint, the apical one very slightly dilated and flattened; lateral ocelli subequally distant from eyes and edge of vertex; vertex flat; cheeks subequal to eyes in width; front coxae largely bare anteriorly, each with a small obscure patch of reddish bristles at the base of the moderately long acute spine; front femur carinate beneath apically; front tarsi dilated, but not equalling their tibiae in width, the metatarsus about equal to the second and third joints combined, broadly and deeply excavated anteriorly, the tip only slightly produced; second to fourth abdominal terga gradually depressed toward the base, the apical margins of the second to the fifth quite abruptly depressed, although this depression is largely obliterated medially on the more basal segments; carina of sixth tergum subtriangular, the apex more or less rounded subtruncate, minutely crenulate on each side, the median carinate teeth of the apical margin of the tergum subequally distant from each other and from the obscure lateral teeth; seventh tergum short and broad, produced medially into a triangular spine.

Sternites: Apical plates of fifth presternite extensive, finely pubescent, occupying a third or more of the area of this sclerite which is linear medially, the medasternite deeply incised medially on the basal margin, each resulting half more or less circular in outline, uniformly covered with apically dilated setae, these dilated tips pectinate, the poststernal strip broadly and slightly incurved medially, conspicuous laterally; lateral portions of sixth presternite longer than broad, slightly bowed, minutely pubescent apically, the medasternal areas widely separated, the inner half of each well covered with long robust, apically flexed setae, outer half delimited by a carinate, heavily sclerotized loop, the poststernal lobe extensive, broader than long, slightly emarginate medially, the latero-apical angles prominent, acute.

Genital armature: Stipites slightly sinuate, gradually dilated to the obliquely compressed and truncate tip, the inner angle of this truncation moderately produced, subacute, the inner surface of the flattened apical area well covered with fine setae or pubescence; sagittae quite straight, considerably exceeding the stipites; volsella more or less obliquely truncate apically.

Puncturation: Fine and close over most of head and thorax, but well separated back of lateral ocelli and on mesonotum medially, the surface of the latter tessellate and dull between the punctures; minuate and close on abdomen basally, becoming considerably more coarse and deep to the fifth tergum where the punctures are distinct but quite close, somewhat more close on the sixth.

Color: Black; antennae dark ferruginous beneath; tegulae paler ferruginous; wings sybhyaline, slightly clouded apically, the nervures ferruginous; front femur polished yellowish-ferruginous on anterior face, the other two dark ferruginous to piceous; front tibia yellow apically, the posterior face rather pale ferruginous in part at least, the other two faces dark; front tarsi yellow, rimmed posteriorly with piceous beneath; spurs ferruginous.

Pubescence: Pale ochraceous above, fading to white beneath and on legs, with no dark admixture on head or thorax, and with only a few very obscure dark hairs noticeable on the fifth abdominal tergum, entirely pale on all the others; second to fifth terga with entire whitish apical fasciae; front tarsal fringe fuscous beneath, the mid tarsal fringe long and entirely white.

Type.—Male; Camp Umatilla, Washington, June 26, 1882, (Samuel Henshaw), [M. C. Z., no. 15714].

Allotype.—Female; topotypical, (Samuel Henshaw), [M.C.Z.].

Range.—The type series, consisting of five males and one female, was collected at Umatilla and Little Spokane, Washington, during June and July, 1882. Since describing that series, two additional specimens have come to hand, as follows: One female, Santa Clara, Utah, (Vasco M. Turner, no. 2208), [Brigham Young Univ.]. One female, Roggen, Colo., Aug. 29, 1930, (H. G. Rodeck), [Un. Colo.]. Both of these specimens show slight color differences from the allotype, in having darker tegulae and antennae. The Utah specimen also has a slightly greater amount of dark pubescence on the apical abdominal segments, and the Colorado specimen has the pubescence of the dorsal portions of the body more whitish than ochraceous. Neither differences of structure nor clearly definable differences of punturation have been detected so far, but it is possible that the males from these localities will show more conspicuous differences.

Subgenus **DEROTROPIS** new subgenus

Tongue: Second joint of labial palpus at least slightly longer than the first (varying from 1.2 to 1.5 times longer in different species); maxillary palpi 3-jointed, with short and barely evident pubescence.

Female.—Mandible 3-dentate, having two distinct apical teeth and a very long cutting edge to the inner angle; basal joint of flagellum somewhat longer than either the pedicel or the second joint; metatarsi considerably shorter and narrower than their tibiae; abdomen cordate, sixth tergum nearly straight in profile, sixth sternum densely covered with rather short scopal hairs, lacking any bare apical lip.

Male.—Mandible 3-dentate, the middle tooth usually nearer the apical one than to the inner angle, with an acute subbasal inferior projection; basal joint of flagellum longer than pedicel, either slightly shorter or slightly longer than the second joint, the apical one quite broadly dilated and flattened; front coxae usually with broad and flat spines; inferior margin of front femur keel-like apically; front metatarsi considerably dilated apically and deeply excavated anteriorly; mid tibia with the usual apical spur; sixth tergum with an entire and more or less triangular carina, the median teeth of the apical margin carinate and nearer the vestigeal lateral angles than to each other; seventh tergum relatively robust, triangularly pointed or spine-like medially.

Male sternites.—Fourth sternum exposed; fifth presternite with distinct apical pubescent sclerites, the median restricted portion with a robust median projection directed toward the medasternite, the latter densely covered with more or less modified and dilated setae, the poststernal strip conspicuous; medasternal areas of sixth sternum well separated, rather extensive in area, densely covered with long flexed setae, the poststernal lobe quite broad and conspicuous.

Genital armature.—Stipites dilated, robust and somewhat flexed apically where they bear conspicuous tufts of long plumose setae; sagittae somewhat exceeding the stipites in length; volsellae robust.

GENOTYPE: *Megachile pascoensis* Mitchell. [Orthotype.]

The females of *Derotropis* may be easily recognized by the peculiar form of the mandibles, having two closely set apical teeth and a long cutting edge to the inner angle. The males however are very difficult to distinguish from those of the subgenus *Xeromegachile.* The group appears to be entirely western in distribution.

Key to Species of Derotropis

Females

1. Scopa entirely black 2
   Scopa pale at least in part 4
2. Cheeks largely black pubescent ....*laurita* Mitchell
   Cheeks largely white pubescent 3
3. Larger (14 mm.); clypeal margin thickened and grooved on the edge. *laurita* var. *semilaurita* Mitchell
   Smaller (10 mm.); clypeal margin with a broad median produced area which is shining and impunctate .....*laurita* var. *sublaurita* Mitchell
4. Mesonotum tessellate and dull, the punctures very fine and sparse. *xerophila* Cockerell
   Mesonotum more shining, the punctures relatively close and deep 5
5. Mesonotum with a patch of fuscous hairs ....*pascoensis* Mitchell
   Pubescence of mesonotum entirely light 6
6. Tegulae ferruginous; punctures of mesonotum sparse medially. *subanograe* Mitchell
   Tegulae dark; punctures of mesonotum uniformly close throughout ..7
7. Sixth tergum polished, with minute sparse punctures; punctures on vertex and mesonotum close but not dense ....*anograe* Cockerell
   Sixth tergum with close fine punctures, shining but not highly polished; punctures of vertex and mesonotum uniformly fine and dense throughout ....*gabrielensis* Mitchell

Males

1. Mesosternum bare and polished, with a pair of short acute protuberances ....*gravita* Mitchell
   Mesosternum pubescent, not spined 2
2. Mesonotum medially almost impunctate, tessellate; seventh tergum triangular, the tip not produced ....*xerophila* Cockerell
   Mesonotum distinctly punctate medially; seventh tergum produced into a slender spine 3
3. Fifth abdominal tergum not fasciate, polished, with sparse minute punctures ....*alamosana* Mitchell
   Fifth tergum white fasciate and closely punctate ....*pascoensis* Mitchell

Megachile (Derotropis) alamosana Mitchell (Pls. VIII and XI.)

Megachile (*Xeromegachile*) *alamosana* Mitchell, Trans. Am. Ent. Soc., LIX, p. 329, 1934.

Only the male sternites and genital armature remain to be described, as follows:

Sternites: Lateral portions of fifth presternite triangular, broader than long, the apical sclerites ovoid, covered with mostly fine pubescence, but that along the apical margin long and coarse, median portion of the presternite not linear, but with an elongate apical projection, the medasternite about twice as broad as long, rather acute laterally, its basal margin with a deep rounded median emargination, setae dilated apically, rather fine over most of its area, but longer along the basal margin, and the median area very densely covered with robust simple setae, the poststernal strip conspicuously outcurved on each side of middle, with a broad median tuft of hairs; lateral portions of sixth presternite much longer than broad, the medasternal areas rather extensive, distinctly separated medially, closely covered with long and moderately robust setae, those along the apical margin with long slender sinuate tips, the poststernal lobe extensive, broadly incurved medially, lateral angles rounded.

Genital armature: Stipites slender above base, gradually enlarged to the broadly dilated tips which are broadly obliquely truncate, the dorsal inner surface of the apical third covered with very long robust plumose setae, these continuing to a distinct lateral apical tuft; sagittae about equalling the stipites in length, robust basally, gradually narrowed to the sinuate approximated tips; volsellae robust, evenly rounded apically.

Type.—Male; Alamosa, Colorado, June 15, 1919, about 7500 ft., [Am. Mus. Nat. Hist.].

Range. — Colorado and Wyoming. The type series of seven males was collected in Colorado with the exception of one specimen from Newcastle, Wyoming. No additional material has since come to hand.

Megachile (Derotropis) anograe Cockerell (Pl. VIII.)

Megachile anograe Cockerell. Ann. Mag. Nat. Hist., (8), I, p. 261, 1908.

Female.—Size: Length 13 mm.; breadth of abdomen 4 mm.; anterior wing 9 mm.

Structure: Face about as broad as long; eyes subparallel; clypeal margin broadly outcurved, straight and entire on the narrow median area; mandible 3-dentate, the middle tooth small, approximate to the apical one, a long cutting edge between it and the inner angle; second joint of labial palpus about one fourth longer than the first joint; basal joint of flagellum slightly longer than pedicel, the second subequal to the pedicel; lateral ocelli subequally distant from eyes and edge of vertex; vertex flat; cheeks slightly broader than eyes; hind metatarsi nearly as broad as their tibiae, but definitely shorter; abdomen ovoid, the second to fourth terga more or less depressed basally, the apical margins but very slightly depressed, and that only at sides; sixth tergum subtriangular in dorsal aspect, the sides very slightly concave and the apex subtruncate, just perceptibly concave in profile with erect pubescence evident.

Puncturation: Fine and close on cheeks and pleura above and over most of mesonotum and scutellum; somewhat more coarse and deep and distinctly separated on vertex, mesonotum and scutellum medially, and on pleura below; quite coarse and well separated on clypeus below; becoming more coarse, but shallow and indistinct, on cheeks below; extremely minute on abdomen, close and indistinct basally, very sparse but more distinct on the polished apical segments, including the sixth.

Color: Black; antennae beneath and tegulae dark reddish or piceous; wings subhyaline, slightly clouded apically, the nervures ferruginous; spurs yellowish-ferruginous.

Pubescence: Entirely white on head, thorax, legs and first two abdominal segments; black on third to sixth terga, the sixth without pale tomentum; first to fifth terga with dense, entire, white apical fasciae; scopa white, black on the fifth and sixth sterna.

Type.—Female; Florissant, Colorado, July 21, 1907, (at *Anogra coronopifolia;* S. A. Rohwer), [U. S. N. M., no. 13668].

Range.—Texas to Montana and Oregon, through Colorado and Wyoming, April (in Texas) to June. Definite records are as follows:

COLORADO: 1♀, Owens Lake, Boulder County, June 4, 1934, (Hicks). 1♀, Colorado Springs, June 15–30, 1896, 6,000–7,000 ft., (H. T. Wickham), [Am. Mus. Nat. Hist.].

NEBRASKA: 1♀, Bad Lands, mouth of Monroe Canyon, Sioux County, June 6, 1901, (on *Astragalus*; M. Cary), [Un. Nebr.].

TEXAS: 2♀, Willis, April 1903, [Mitchell].

Additional specimens have been identified from Montana—Powderville; and Oregon—Harney County (June).

Megachile (Derotropis) gabrielensis Mitchell (Pl. VIII.)

Megachile (*Megachiloides*) *gabrielensis* Mitchell, Trans. Am. Ent. Soc., LIX, p. 346, 1934.

It now seems probable that *gabrielensis* is the female of *gravita,* but the relationship remains to be established.

Type.—Female; San Gabriel, Los Angeles County, California, June, (C. E. Hutchinson), [U. S. N. M., no. 39987].

Range.—California to Montana. No specimens other than the type series of three females have been seen. One of the paratypes was collected at Mokelumna Hill, California, (Blaisdell), and the other at Big Fork, Montana, June 29, 1904.

Megachile (Derotropis) gravita Mitchell (Pl. XI.)

Megachile (Xeromegachile) gravita Mitchell, Trans. Am. Ent. Soc., LIX, p. 322, 1934.

Only the male sternites and genital armature remain to be described, as follows:

Sternites: Lateral portions of fifth presternite subtriangular, about as broad as long, the apical sclerites somewhat ovoid, rather small, covered with long fine pubescence, median portion of presternite linear, with a pronounced median apical projection, the medasternite about four times broader than long, its basal margin deeply incised medially, almost dividing it into halves, each of which is quite closely set with short setae, those laterally and basally obscurely dilated and flexed at tips, the poststernal strip narrow, broadly and evenly outcurved; lateral portions of sixth presternite somewhat longer than broad, with considerable fine pubescence medially and apically, the medasternal areas widely separated, inner ends rounded, outer ends acute, densely covered with more or less elongate and sinuate setae, the poststernal lobe extensive, apical margin incurved, lateral angles subacute.

Genital armature: Stipites narrowed above base, dilated and ventrally flexed toward the tips, these rounded and slightly flexed laterally, dorsal inner surface densely covered with very long and robust, plumose setae, and a conspicuous tuft of long setae at apex laterally; sagittae robust, equalling the stipites in length, the tips slightly enlarged, approximate, with short pubescence on outer surface; volsellae robust, truncate apically.

Type.—Male; San Bernardino County, California, May, (Coquillett), [U. S. N. M., no. 39973].

Range.—California. No specimens other than the type series of three males have been seen.

Megachile (Derotropis) laurita Mitchell

Megachile laurita Mitchell, Psyche, XXXIV, p. 115, 1927.

The type series of this species included three specimens, the type described below [M. C. Z., no. 15711], and two other specimens from Utah which showed certain differences from the type and were consequently described as subspecies [no. 15712 and 15713]. Whether these three forms are distinct or merely represent variations of a quite variable species cannot be determined with the limited amount of material available at present. The Utah specimens agree with the type except for the differences noted below.

Female.—Size: Length 12 mm.; breadth of abdomen 4 mm.; anterior wing 8 mm.

Structure: Face about as long as broad; eyes subparallel; clypeal margin out-curved, the median third straight, the edge slightly thickened and grooved; mandible 3-dentate, the two apical teeth approximate, with an extremely long cutting edge between the second and third; second joint of labial palpus about one half longer than the first; second joint of flagellum subequal to pedicel, the first longer; lateral ocelli subequally distant from eyes and edge of vertex; vertex flattened; cheeks broader than eyes; hind metatarsi not much more than half as long as their tibiae, and much narrower, almost of the male type; second and third abdominal terga somewhat depressed basally, the apical margins of the second to the fourth very slightly depressed toward sides; sixth tergum straight in profile with abundant erect hairs visible.

Puncturation: Fine and close on face, cheeks above, pleura above, and mesonotum and scutellum laterally; more sparse but rather fine on mesonotum and scutellum medially; more coarse deep and sparse on pleura below and vertex laterally, closer on vertex medially; deep and rather coarse on clypeus, close laterally, more distinct but not sparse medially; minute and indistinct on abdomen basally, becoming fine and close on the third tergum, fine and sparse on the shining fourth, fifth and sixth.

Color: Black; antennae reddish-fuscous beneath; tegulae more ferruginous; wings subhyaline, faintly clouded apically, the nervures ferruginous to piceous; spurs yellowish.

Pubescence: Whitish on middle of face, pleura, propodeum, mesonotum, scutellum, and basal abdominal tergum; fuscous on clypeus, vertex, most of cheeks, thorax ventrally, legs, and second to sixth abdominal terga, the second with some whitish pubescence basally; second to fifth terga with white apical fasciae, dense laterally, thin medially; scopa entirely fuscous.

Type.—Female; Umatilla, Oregon, June 24, 1882, (Samuel Henshaw), [M. C. Z., no. 15711].

Megachile (Derotropis) laurita var. **semilaurita** Mitchell

Megachile laurita semilaurita Mitchell, Psyche, XXXIV, p. 116, 1927.

Female.—Larger (length 14 mm.; breadth of abdomen 5 mm.; anterior wing 9 mm.); face slightly broader than long; clypeal margin thicker and more deeply grooved than in *laurita*; apical margins of second to fourth terga rather deeply depressed toward sides, but only slightly so medially, the fifth very slightly depressed, at extreme sides; pubescence white on upper part of face, cheeks, most of vertex, thorax above, behind and laterally, and the first abdominal segment, as also the second in large part; pubescence fuscous on clypeus, thorax beneath, legs, and third to sixth terga, with some short fuscous hairs on vertex laterally; second to fifth terga with dense entire white apical fasciae; scopa entirely fuscous.

Type.—Female; Utah, [M. C. Z., no. 15712].

Megachile (Derotropis) laurita var. **sublaurita** Mitchell

Megachile laurita sublaurita Mitchell, Psyche, XXXIV, p. 117, 1927.

Female.—Smaller (length 10 mm.; breadth of abdomen 3.5 mm.; anterior wing 7.5 mm.); median third of clypeus very slightly incurved, this part shining and impunctate, the edge not appreciably thickened; lateral ocelli slightly nearer edge of vertex than to eyes; hind metatarsi much narrower and only about half as long as their tibiae; puncturation much as in *laurita* s. str., but relatively more fine on clypeus, vertex and abdomen, more sparse on the latter; pubescence mostly white on cheeks, middle of face, mesonotum, scutellum, propodeum, pleura above, and first abdominal segment; fuscous on clypeus, vertex, pleura below, thorax ventrally, legs, and second to sixth terga, with intermixed fuscous hairs on face, back of eyes and center of mesonotum; second to fifth terga with dense entire white apical fasciae; scopa entirely fuscous.

Type.—Female; Utah, [M. C. Z., no. 15713].

Megachile (Derotropis) pascoensis Mitchell (Pls. VIII and XI.)

Megachile (Xeromegachile) bakeri Mitchell (nec. Cockerell), Trans. Am. Ent. Soc., LIX, p. 316, 1934.

Megachile (Xeromegachile) pascoensis Mitchell, Trans. Am. Ent. Soc., LIX, p. 320, 1934.

Megachile (Megachiloides) astata Mitchell, Trans. Am. Ent. Soc., LIX, p. 345, 1934.

It is now evident after a further study of *bakeri* and *pascoensis* that they are the same. The hidden sternites and genital armature give evidence of this, since there are no discernible differences between them. The only evident external difference, that in the puncturation of the mesonotum, evidently represents an individual variation. The relationship of *pascoensis* male to *astata* female has been established by Professor Timberlake who states that they are without doubt the same. The name *pascoensis* still holds however, because of page precedence.

The female has been fully described previously. The male also was described, excepting the tongue characters, which indicate its true affinity to *Megachiloides* rather than to *Xeromega-*

chile, the second joint being slightly longer than the first with a proportion of about 6 : 5. The hidden abdominal sterna and genital armature of the male remain to be described, however, as follows:

Sternites: Fifth presternite with a conspicuous, apically dilated and truncate median projection, the two halves on each side of this long triangular, the apical margin of each occupied by a more or less circular and sharply defined plate which is covered with rather long fine pubescence, the medasternite almost completely divided medially by a deep and broad basal emargination, covered with fine undilated setae, these more dense toward the apical middle, the poststernal strip broadly outcurved on each side of middle; lateral portions of sixth presternite not definitely set off from the median portion of the plate, each with a small amount of fine pubescence, the medasternal areas broad medially, narrowed laterally, more or less triangular, distinctly but not widely separated, densely covered with long setae, most of which are abruptly flexed apically, the poststernal lobe very inconspicuous, both narrow and short, the lateral angles obliquely truncate.

Genital armature: Stipites gradually, but pronouncedly constricted above base, gradually dilated from there to the broad, obliquely truncate tips which are conspicuously clothed with long plumose hairs; sagittae robust basally, slightly narrowed toward the tips which are slightly flexed, and slightly exceed the tips of the stipites; volsellae robust, broadly truncate apically.

Type.—Female; San Bernardino County, California, (Coquillett), [U. S. N. M., no. 39972].

Range.—California to Washington. In addition to the paratype series there are now three other specimens to be recorded, as follows: 2♀, Riverside, California, June 13 and 20, 1932, (Timberlake, on *Godetia amoena*). 1♂, Riverside, California, June 16, 1932, (Timberlake, on *Godetia bottae*).

Flower records.—*Godetia amoena* and *G. bottae.*

Megachile (Derotropis) subanograe Mitchell

Megachile (*Megachiloides*) *subanograe* Mitchell, Trans. Am. Ent. Soc., LIX, p. 344, 1934.

This species was fully described in Part I of this revision.

Type.—Female: Green River, Wyoming, 6100 ft. alt., July 2, 1920, [Am. Mus. Nat. Hist.].

This is a unique specimen.

Megachile (Derotropis) xerophila Cockerell (Pl. XI.)

Megachile xerophila Cockerell, Pan-Pacific Ent., IX, p. 27, 1933.

Female.—Size: Length 10 mm.; breadth of abdomen 3.5 mm.; anterior wing 7 mm.

Structure: Face about as broad as long; eyes subparallel; clypeal margin entire, outcurved, but the median third straight; mandible 3-dentate, a long cutting edge between the middle and inner teeth; second joint of labial palpus only slightly longer than the first (ratio about 6 : 5); basal joint of flagellum subequal to pedicel, the second joint shorter; lateral ocelli subequally distant from eyes and edge of vertex; vertex slightly convex, the hind margin slightly incurved; cheeks slightly narrower than eyes; hind metatarsi definitely shorter and narrower than their tibiae; abdomen broadly cordate, apical margins of the terga only slightly depressed, the sixth tergum nearly straight laterally in dorsal aspect and in profile, with the erect pubescence short and inconspicuous.

Puncturation: Fine and indistinct on vertex and mesonotum, very sparse in center of the tessellated mesonotum, closer and more distinct on cheeks and face, very close and fine on clypeus above, more coarse, deep and sparse below, close and fine on pleura above, more distinctly separated below, fine and quite distinctly separated on scutellum, minute and crowded on abdomen basally, becoming more deep and distinct, but still fine and close to the fifth tergum, very fine and close on the sixth.

Color: Black; tegulae and antennae piceous; spurs yellow; wings hyaline, the nervures piceous.

Pubescence: Entirely white except for scopa apically; first to fifth terga with narrow but conspicuous and entire white apical fasciae; sixth tergum with very fine and inconspicuous pale pubescence; scopa white, black on the sixth sternum and across apex of fifth.

Male.—Size: Length 10 mm.; breadth of abdomen 3.7 mm.; anterior wing 7 mm.

Structure: Face about as broad as long; eyes subparallel; clypeal margin entire; mandible 3-dentate, inferior projection sub-basal and acute; second joint of labial palpus slightly longer than the first; basal joint of flagellum longer than pedicel, subequal in length to the second joint, the apical joint broadly dilated and flattened; lateral ocelli subequally distant from eyes and edge of vertex; vertex slightly convex, hind margin nearly straight; cheeks slightly broader than eyes; front coxae bare anteriorly, each with a small rounded patch of short densely crowded yellowish setae at the base of the acute, moderately long spines; front femora dilated apically, with a quite prominent ventral keel; front tarsi dilated, the metatarsi about equalling the tibiae in width, anterior margin excavated, the tip but slightly produced, the joint slightly shorter than the other joints combined; mid and hind metatarsi short; abdomen rather broad, apical margins of the terga quite deeply depressed, at least laterally, especially on the more apical segments; sixth tergum ventral in position, its carina entire, broadly rounded or subtriangular, apical margin of the tergum with widely separated carinate median teeth and short inconspicuous triangular lateral teeth; seventh tergum evident as a rather robust triangular projection.

Sternites: Lateral portions of fifth presternite much broader than long, median portion not linear, with a robust median spine-like apical projection, the apical sclerites rather extensive, twice as broad as long, with considerable rather fine pubescence, the medasternite about three times broader than long, its basal margin incurved or broadly emarginate medially, uniformly set with short fine setae, those toward the base broadly dilated and flattened apically, the poststernal strip slightly outcurved on each side of middle, with a median tuft of fine setae; lateral portions of sixth presternite longer than broad, the medasternal areas distinctly separated, each terminated laterally by a curved carina, inner end rounded, rather restricted in area, with rather sparse short and robust apically curved setae, the poststernal lobe small, broader than long, lateral angles produced, acute.

Genital armature: Stipites narrowed above base, dilated, obliquely compressed and slightly sinuate apically, dorsal inner surface toward apex with a few fine hairs, and a few longer hairs fringing outer margin of apex; sagittae nearly straight, moderately robust, tips slightly flexed and slightly exceeding stipites; volsellae robust, obliquely truncate apically.

Puncturation: Fine and sparse on vertex and scutellum, but practically absent on the tessellated mesonotum; more distinct and deep, but fine and close, on cheeks and pleura; minute and close on abdomen basally, becoming deeper and more distinct on the shining apical segments, more shallow and irregular on the sixth tergum dorsally.

Color: Black; antennae dark, but tegulae more ferruginous; front femur yellowish on inner face except for a dorsal dark marginal band, upper surface yellowish-ferruginous, the remaining face black except for the yellow edge of the ventral keel; front tibiae yellowish apically, otherwise dark on outer face, paling to yellowish on the two inner faces; front tarsi pale yellow basally, more reddish apically; middle and hind legs entirely black; spurs yellow; wings hyaline, the nervures piceous.

Pubescence: Entirely white, long and dense on face and clypeus, with dense tufts behind front coxae and femora, and the front and middle tarsi with long posterior white fringes, that on the front tarsi brownish beneath, the metatarsal excavation rimmed with dark setae on outer edge.

Type.—Female; Borego, San Diego County, California, April 3, 1932, (W. P. and Milene Cockerell).

Range. — Borego Valley, California. A pair of specimens is now at hand kindly sent me by Professor Timberlake and bears the following data: 1 ♀, Borego Valley, March 26, 1933, (Timberlake, on *Helianthus niveus*). 1 ♂, Borego Valley, March 26, 1933, (McKenzie, on *Chaenactis stevioides*).

Flower records.—Helianthus niveus, Chaenactis stevioides.

EXPLANATION OF PLATES

PLATE VIII

Outlines of apex of male abdomen, male and female mandibles and male mid tarsus.

PLATE IX

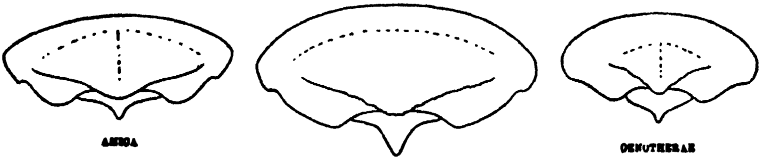
Outlines of fifth, sixth and eighth sternum of male and of male genital armature in *Xanthosarus* and *Phaenosarus*.

PLATE X

Outlines of fifth, sixth and eighth sternum of male and of male genital armature in *Megachiloides*.

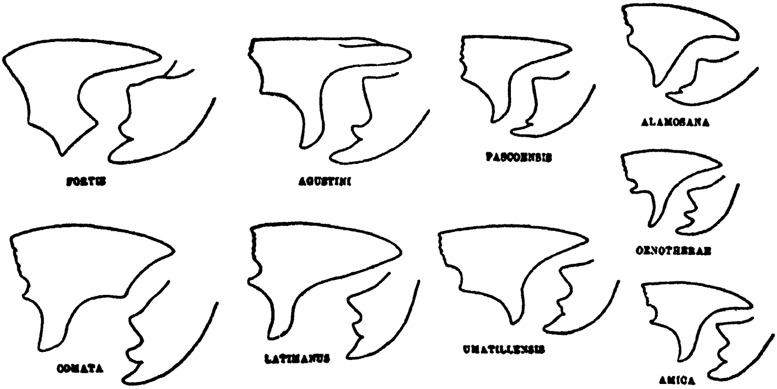
PLATE XI

Outlines of fifth, sixth and eighth sternum of male and of male genital armature in *Derotropis*.



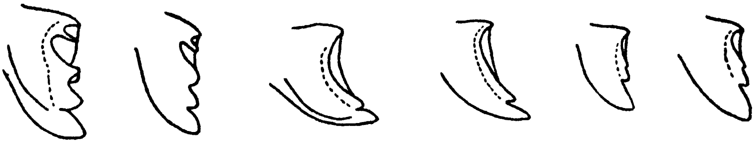
AMICA UMATILLENSIS OENOTHERAE

APEX OF MALE ABDOMEN



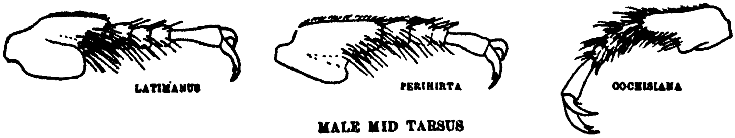
FORTIS AGUSTINI PASCOENSIS ALAMOSANA OENOTHERAE COMATA LATIMANUS UMATILLENSIS AMICA

MALE MANDIBLE



AGUSTINI PERIHIRTA GABRIELENSIS ANOGRAE OENOTHERAE AMICA

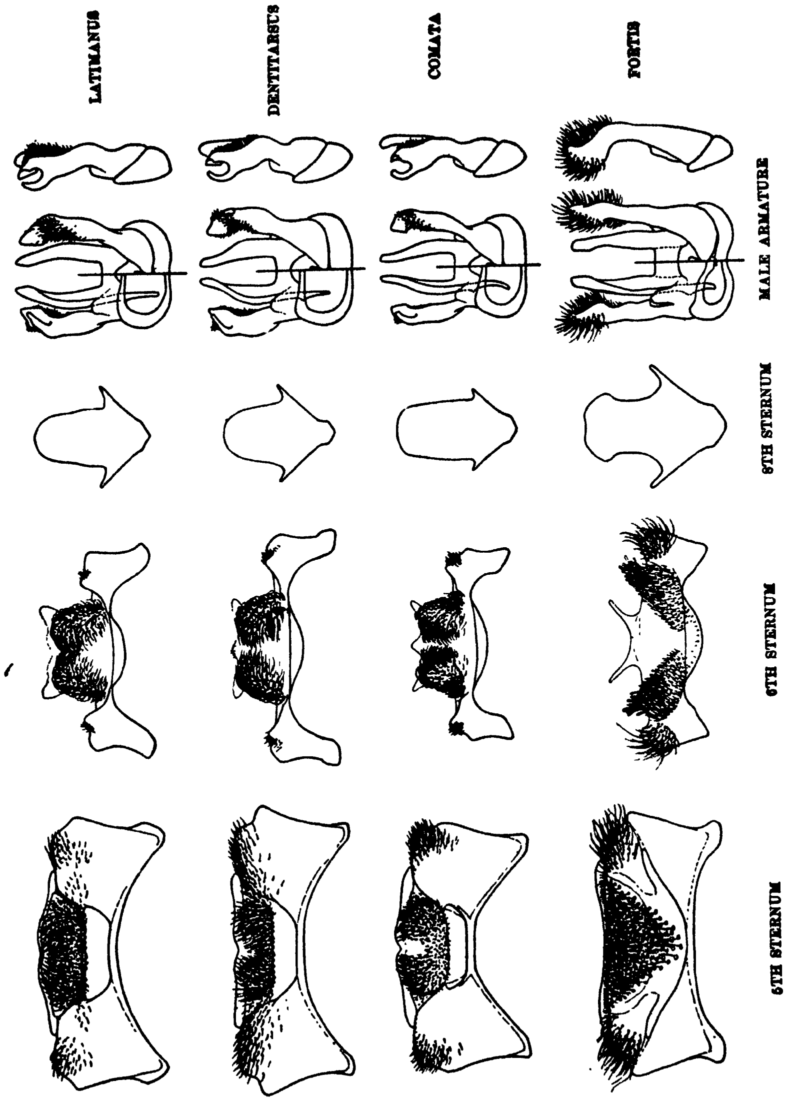
FEMALE MANDIBLE



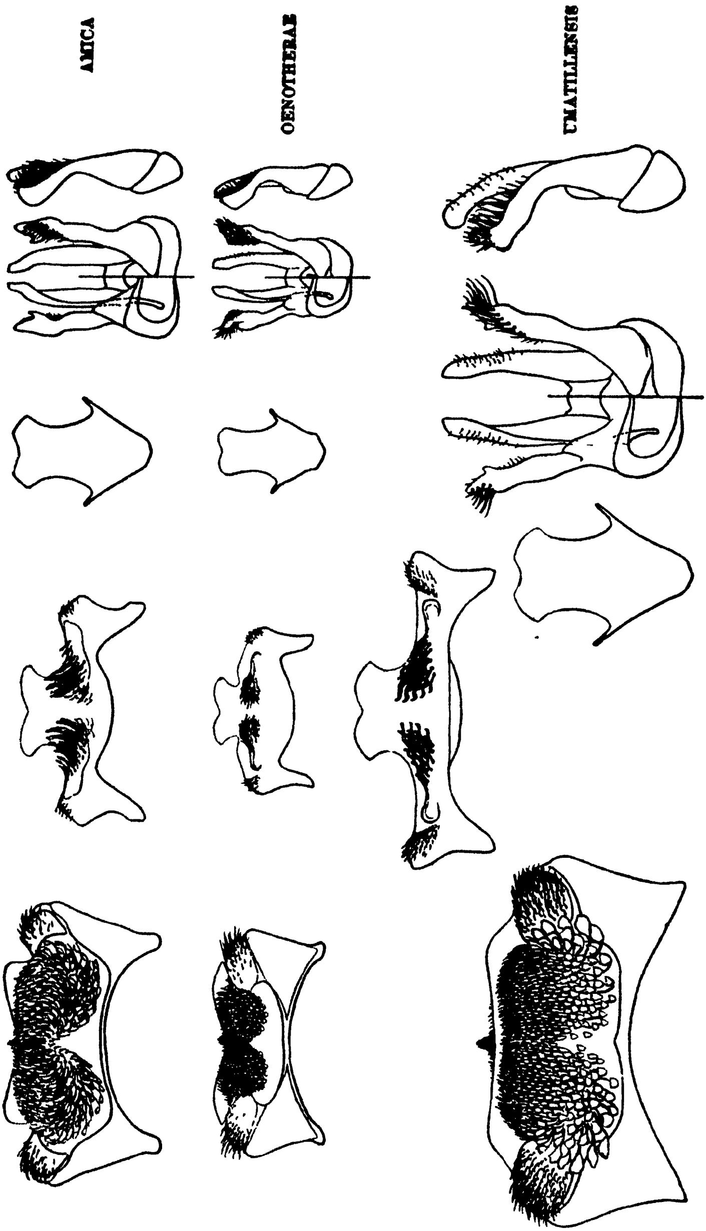
LATIMANUS PERIHIRTA COCHISIANA

MALE MID TARSUS

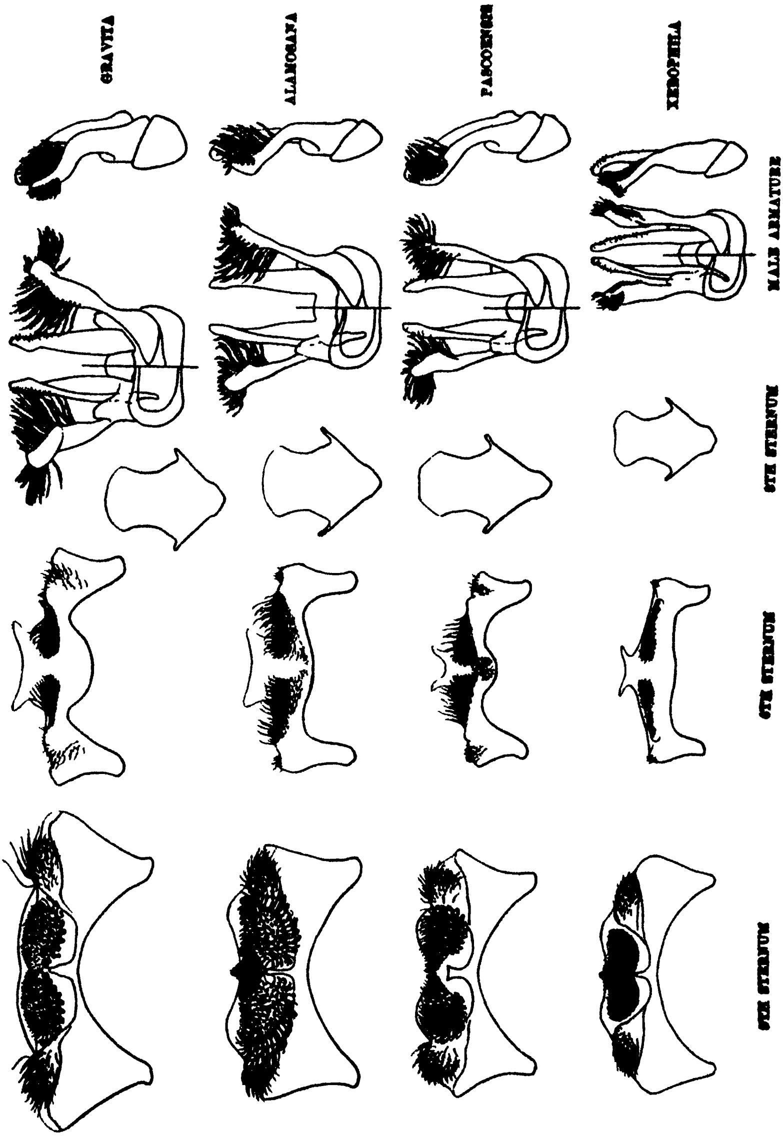
MITCHELL—NEARCTIC MEGACHILE



MITCHELL—NEARCTIC MEGACHILE



MITCHELL—NEARCTIC MEGACHILE



MITCHELL—NEARCTIC MEGACHILE

NEW GENERA AND SPECIES OF THE MELANOPLI FOUND WITHIN THE UNITED STATES AND CANADA

(ORTHOPTERA: ACRIDIDAE)

PARTS VII, VIII AND IX

BY MORGAN HEBARD

(Plates XII–XVII)

Unless otherwise noted the material here recorded is in the author's collection, except the series collected by Rehn and Hebard, which latter has been shared with the Academy of Natural Sciences of Philadelphia.

The author's publications on the North American Melanopli began in 1917 with a study of the Mexican Melanopli, published in the proceedings of the Academy of Natural Sciences. The first of the present series was published in 1918 and the last in 1935,* all in the Transactions of the American Entomological Society except the description of a single new species of *Melanoplus*, published in the Entomological News in 1923.**

In the last two parts it was found advisable to consider all of the species of the seven Groups concerned, and this method has been followed in parts VII and IX of the present study. Assistance of the utmost value has been given through the kindness of R. H. Beamer of the University of Kansas, F. B. Isely of Trinity College, Nathan Banks of the Museum of Comparative Zoology and the authorities of the United States National Museum.

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* Trans. Am. Ent. Soc., LX, pp. 337-390.

** Ent. News, XXXIV, p. 260.

PART VII. THE INDIGENS GROUP OF THE GENUS MELANOPLUS

So similar are the species of this group in many features and so much individual variation is shown in several of the limited number of characters by which the species and races are distinguishable that their proper association has always been most difficult. It was for this reason that we have postponed a final report on them until we have gone over all the species of the short-winged Melanopli, examining the penis of each with a view to finding out just how much help the characters of that organ might afford. Nowhere in these studies has the structure of the penis proved more valuable in placing the actual number of species and races represented.

We find that in past literature the confusion has been very great, and though all existing synonymy was correctly established by us in 1928,[1] we at that time not only made many errors in referring to *indigens* and *oregonensis triangularis* specimens which were actually otherwise referable, but we also recognized four races of *oregonensis*, whereas that species has but a single northern race, *oregonensis triangularis*, while *marshalli* represents a distinct though very closely related species of which *ascensor* is a weakly defined but apparently separable western race. Although it is evident that we made a series of serious errors we can state definitely that, without recourse to the characters of the penis, little better could ever be expected. Thus in the material referred incorrectly to *indigens* all other features except those of the penis showed only differences which might easily and were then believed to indicate mere individual variation and the individual variation in the shape of the supra-anal plate is so unusually great that at that time we referred incorrectly to *oregonensis triangularis* those specimens in which the supra-anal plate is very much shorter than is normal for *indigens*. With the differences of the penis as a guide, however, it is now evident that the richness of coloration of the ventral surfaces of the caudal femora in those specimens is a safe index in distinguishing them from *oregonensis triangularis*, which difference is however well known to be usually an utterly unsafe feature except in conjunction with other more stable characters and we consequently repudiated it at that time.

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[1] Proc. Acad. Nat. Sci. Phila., LXXX, pp. 266 to 271.

In associating the forms nearer *oregonensis* even more misleading were the few (and well known to be unsatisfactory) external features by which *marshallii* could be separated from *oregonensis*. The average slightly narrower male supra-anal plate and average smaller size of the former were the strongest reasons we had for giving that insect even racial recognition, and the Wyoming series which were smaller than is usual for *oregonensis* appeared to indicate intergradation. As a matter of fact large series from Colorado and Utah are now found to have a penis sufficiently differently constructed to warrant specific separation and our Wyoming material (all from the northern portions of that State) is as clearly representative of *oregonensis*. Though we have no males from central or southern Wyoming, our knowledge of the distribution of other species in that State enables us to predict that *oregonensis* will probably be found in the mountains at sufficient elevation south to central eastern and southwestern Wyoming, while that species is as probably supplanted by *marshallii* in similar environment throughout southeastern Wyoming. The distribution westward and intergradation between typical *marshallii* and *marshallii ascensor* can only be definitely charted when material of the species from a number of stations in the Uinta Mountains has been secured, though we believe that intergradation will be found in the mountains in the vicinity of the Green River in extreme northwestern Colorado and northeastern Utah.

It is particularly interesting to note that the ventral surfaces of the caudal femora are dull buff, tinged with orange only in intensive specimens of some series, in all of the species of this group except in *indigens*. These areas are rich reddish or orange in all well preserved specimens of the races of that species except in decidedly recessive or badly discolored specimens.[2]

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[2] Such unfortunately is the case in the type of *indigens indigens*, which though dark in general coloration, has the ventral surfaces of the caudal femora dirty buff, this plainly the result of very poor preservation.

1. Male subgenital plate with apex produced, coarsely transversely nodose or weakly binodose. Penis with very different development of dorsal lobes. Tegmina averaging narrower and so often more separated in both sexes. 2

Male subgenital plate with apex scarcely produced, feebly binodose. Penis with dorsal lobes very greatly produced as very large, horizontally spread, erect processes which in caudal aspect show an exceptionally great expanse (Pl. XII, fig. 10). Male cerci proportionately smaller, (not spatulate distad. Male furcula small and very strongly divergent. Tegmina averaging broader and so less separated in both sexes than is usual in the related species. Ventral surfaces of caudal femora dull yellowish buff.) Mountains of central western Idaho and adjacent Washington, in Canadian Zone. ....*payettei* new species

2. Male cerci not widened distad and there narrowing to the broad rounded apex; distal spatulation consequently not indicated. 3

Male cerci widened distad, the distal portion definitely (though rarely strongly) elongate spatulate. (Ventral surface of caudal femora, at least in external portion, richly colored (rich orange to deep red) except in recessive specimens.) 7

3. Ventral surface of caudal femora dull yellowish buff, tinged with orange in most intensive series 4

Ventral surface of caudal femora, at least in external portion, richly colored (rich orange to deep red), except in recessive specimens. Male furcula not heavy, less than one-third as long as the shield-shaped supra-anal plate. Penis with projecting portions of dorsal lobes very small and short, rounded (Pl. XIII, figs. 1 and 2). Missoula, (in western), Montana. ....*indigens missoulae* new subspecies

4. Male supra-anal plate much longer than broad. 5

Male supra-anal plate only slightly longer than broad, triangularly shield-shaped. Furcula and penis as in *oregonensis oregonensis*. Rocky Mountains in southern Alberta and northern Montana.

oregonensis triangularis Hebard

5. Male penis with dorsal lobes vertical, their apices not produced cephalad.[8] (Male supra-anal plate shield-shaped to linguliform. Male furcula long and heavy, less than half as long as supra-anal plate, rarely divergent.) Rocky Mountains from northern Montana to (probably central eastern and) southwestern Wyoming and extreme southeastern Idaho, in Canadian Zone.

oregonensis oregonensis (Thomas)

Male penis with dorsal lobes projecting cephalad. 6

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[8] Showing nearest approach to the type developed in *indigens missoulae*, see plate XIII, figs. 1 and 2.

6. Male penis with dorso-proximal apices of dorsal lobes produced cephalad (Pl. XII, fig. 2). Male supra-anal plate shield-shaped to linguliform. (Male furcula variable.) Mountains of Colorado (and probably southeastern Wyoming) at high elevations, (probably in Canadian) and in Hudsonian Zone. .... *marshalli marshalli* (Thomas)

   Male penis with dorsal lobes produced cephalad in dorsal portion but with a delicate integument the cephalic margin of which is vertical which joins this production to the basal portions (Pl. XII, fig. 5). Male supra-anal plate narrowly linguliform. (Male furcula long and heavy, less than half as long as supra-anal plate, rarely divergent.) Uinta and Wasatch Mountains of Utah in Canadian and Hudsonian Zones. .... *marshalli ascensor* (Scudder)

7. Male penis with dorsal lobes broader and erect, with lateral surfaces flattened, dorsal outline rounded angulate in lateral aspect and apices not meeting above the parameres. (Pl. XIII, fig. 3). Mountains of extreme western Montana (possibly only in southern portion) and throughout south-central Idaho. .... *indigens indigens* Scudder

   Male penis with dorsal lobes narrower, slanting inward, with moderately convex lateral surfaces and apices evenly rounded and meeting above the parameres. Mountains of extreme northwestern Montana (probably north-central Idaho) to northeastern Oregon.
   indigens digitifer new subspecies

A key to the forms of as difficult a group as the present should be used as an aid, but not as the sole means to distinguish undetermined material. Additional series are badly needed from extreme western Montana, southern Wyoming, northeastern Utah, central and northern Idaho and eastern Washington, and without material from these regions the group can not be analyzed with finality. Thus portions of the limits of distribution of several races now remain far from definite, the peculiar condition of *indigens* occurring in the Payette Lake region of Idaho is assigned to the typical race only tentatively and the condition, known from only a female, which is present in eastern Washington, may well represent a distinctive and undescribed race or species.

Melanoplus marshalli marshalli (Thomas) (Pl. XII, figs. 1 to 3.)

1875. *Pezotettix marshalli* Thomas, Rept. Expl. and Surv. West of 100th Merid., v, p. 889, pl. 45, fig. 3. [♂, ♀; mountains of southern Colorado.]

1897. *Podisma marshalli* Scudder, Proc. U.S. Nat. Mus., xx, p. 108, pl. 7, fig. 9. [♂, ♀; Mount Lincoln, Colorado, at 11000 to 13000 feet.]

I was correct in placing *gillettei* Scudder as a synonym in 1928, but the insect is the typical race of a closely related species and not a race of *oregonensis* (Thomas) as I then supposed, as is now shown by study of the penis. The individuals which were then considered atypical representatives of "*oregonensis marshalli*", from the type of that organ, are seen to be referable to *oregonensis oregonensis.*

The present race is represented in the author's collection by material from many localities in the Rocky Mountains of Colorado, those with altitude given being from 10000 feet or over in the Hudsonian Zone.[4] As already noted here, this race almost certainly occurs also in the mountains of southeastern Wyoming in similar environment. Mount Lincoln is a southern known limit. Extensive collecting in the San Juan Rockies of southwestern Colorado indicates that it is not present there, nor has it been found anywhere much west of the continental divide, though it is probably present in the mountains of northwestern Colorado.

The only material at hand which has not been previously correctly reported is the following.

COLORADO: Trail Ridge Road in Rocky Mountain National Park, 10500 feet, VIII, 25, 1933, (G. Alexander), 1♂, 1♀. North Park, VIII, 25, 1926, (B. B. Fulton), 2♂, 2♀. Summit of Gore Mountain near Toponas, VII, 10, 1927, (J. C. Bradley), 1♂, 1♀.

Melanoplus marshalli ascensor (Scudder) (Pl. XII, figs. 4 and 5.)

1897. *Podisma ascensor* Scudder, Proc. U.S. Nat. Mus., xx, p. 107, pl. 7, fig. 8. [♂, ♀; American Fork Canyon, [Wasatch Mountains,] Utah.]

As I have noted in 1928,[5] the type of this insect is an abnormal specimen in which, though adult, the form of the genitalia of the instar preceding maturity has persisted. This condition is very rare and is apparently developed only in species which, living in exceptionally rigorous environment, are forced in growth at an unusual rate, during the brief period in which the temperature is sufficiently high for them to move about and feed normally.

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[4] See Hebard, Proc. Acad. Nat. Sci. Phila., LXXXI, p. 375 (1929), for five Colorado records.

[5] Proc. Acad. Nat. Sci. Phila., LXXX, p. 269.

At that time *ascensor* was also placed as a race of *oregonensis*, but study of the penis shows it to be a race of the closely related *marshalli* (Thomas).

The present insect is known only from the Bear River Mountains and the Wasatch Mountains of Utah, where it occurs in the Canadian and Hudsonian Zones at elevations from 6400 up to 10000 feet. It is apparently very scarce at the latter elevation and reaches its maximum abundance at distinctly lower elevations than does *marshalli marshalli*. It is now known from Logan Canyon south to American Fork Canyon. The Uinta Mountains of northeastern Utah, which extend east and west for a great distance, may carry this insect far east of its known range. The area of intergradation with typical *marshalli* can, however, not be determined until material from the mountains of northeastern Utah and northwestern Colorado has been secured.

The caudal tibiae are very dull weak glaucous, the " pale red " noted by Scudder being attributable to discoloration.

Only the following material, additional to the described pair, is known.

UTAH: Red Banks in Logan Canyon, Bear River Mountains, 6400 feet, VIII, 10, 1928, (Rehn and Hebard; very few in areas of " Cow Cabbage " (*Wyethia amplexicaulis* Nutt.), where *Melanoplus utahensis* Sc. was abundant and also in mountain herbage in open), 1♂, 4♀. Lake Catharine in Wasatch Mountains, 10000 feet, VIII, 19, 1924, (J. A. G. Rehn; granite slopes with firs and patches of Hudsonian Zone vegetation, only specimen seen), 1♀. Lake Martha in Wasatch Mountains, 9200 to 9700 feet, VIII, 19, 1924, (Rehn and Hebard; scarce in lush Hudsonian Zone herbage with much fir about), 4♂, 8♀. Big Cottonwood Canyon in Wasatch Mountains, 7400 feet, VIII, 18, 1924, (Rehn and Hebard; Canadian Zone, like *Melanoplus utahensis* present in moderate numbers in lush herbage near stream on flat with much Aspen and spruce), 2♂, 6♀.

Melanoplus oregonensis oregonensis (Thomas)

1875. *Pezotettix oregonensis* Thomas, Wheeler's Rept. Expl. and Surv. West of 100th Merid., v, p. 888. [♂; northwestern United States.[6]]

1897. *Podisma oregonensis* Scudder, Proc. U.S. Nat. Mus., xx, p. 110, pl. 7, fig. 10. [♂, ♀: Yellowstone, Montana; Henry Lake, Idaho.]

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[6] The original labelling " Oregon " was due to the inexact or inaccurate method often shown on natural history specimens secured on the early government expeditions to the Northwest.

The type is lost but the original description of the male furcula and cerci give convincing evidence that Scudder correctly recognized the species in 1897. His material then recorded from Fort McLeod, Alberta, represents *oregonensis triangularis* Hebard. In 1932 the author reported a series from Logan Pass in Glacier Park, Montana, of which fifteen males were typical of *oregonensis oregonensis* or nearly so, one male representing *oregonensis triangularis*. The area of intergradation between these races evidently lies in northern Montana. West of the Bridger Range and the Continental Divide in southwestern Montana and southeastern Idaho, the present species is supplanted by the races of *indigens* Scudder and the related *payettei* here described.

The following unreported material is in the author's collection.

MONTANA: Madison County, 8000 feet, VIII, 13, 1919, 1♂. Continental Divide in Beaverhead County, VIII, 18, 1925, 1♀.

WYOMING: Mount Washburn in Yellowstone Park, 9800 feet, VIII, 18, 1930, (E. R. Tinkham; on bare grassy ridge), 7♂, 7♀; 9300 feet, VIII, 13, 1922, (M. Hebard; moderately common on grassy north slopes), 3♂, 1♀; 8600 feet, VIII, 18, 1930, (E. R. Tinkham), 4♂, 4♀. Dunraven Pass in Yellowstone Park, VIII, 31, 1924, (N. Criddle), 1♂. Grand Canyon of the Yellowstone River, 7900 feet, VIII, 12, 1922, (M. Hebard; in lush herbage), 3♂, 3♀; VII, 26, 1923, (B. B. Fulton), 2♂, 2♀. Sheep Mountain in Gros Ventre Range, 10000 to 10500 feet, VIII, 4, 1922, (M. Hebard; few at 8000 feet, moderate numbers but local up to 10200 feet, a very few at 10500 feet, no Orthoptera whatever above that elevation, in Hudsonian Zone herbage above timber line), 15♂, 11♀. Menor's Ferry in Jackson's Hole, 6500 feet, VII, 5 to 12, 1922, (M. Hebard; local, moderate numbers in lush grasses and mountain plants in Aspen thickets in valley), 9♂, 6♀. Peak north of Death Canyon in Teton Range, 10000 to 11300 feet, VIII, 8, 1922, (M. Hebard; moderately common in Hudsonian Zone herbage, few in Arctic-Alpine Zone grasses and plants), 13♂, 8♀, 2 juvs. Death Canyon in Teton Range, 8600 feet, VIII, 7, 1922, (M. Hebard; very few in mountain meadow of lush vegetation), 3♀.

IDAHO: Henry Lake, VII, 28, 1930, 2♂; VIII, 1883, (L. Bruner), 4♂, 5♀. Georgetown Canyon in Aspen Range, 6650 to 6800 feet, (Rehn and Hebard; few in Canadian Zone undergrowth in Aspen thickets.

Melanoplus oregonensis triangularis Hebard

1928. *Melanoplus oregonensis triangularis* Hebard, Proc. Acad. Nat. Sci. Phila., LXXX, p. 269, pl. 25, fig. 5. [♂, ♀; Middle Fork of Old Man's River (near Fort McLeod) in Livingston Range (type locality) and Waterton, Alberta; Swan Range and Flathead Lake, Montana.]

A male in a series in which the majority represent *oregonensis oregonensis* (Thomas) from Glacier Park, Montana, was recorded by the author in 1932.

The material originally recorded as this race from Idaho is now known, from study of the penis, to represent *indigens* Scudder.

Melanoplus indigens missoulae new subspecies

(Pl. XII, fig. 6; pl. XIII, figs. 1 and 2.)

1928. *Melanoplus indigens* Hebard, Proc. Acad. Nat. Sci. Phila., LXXX, p. 267. [Only the series of eight males and eleven females from Missoula, Montana.]

Hitherto I had supposed that a single variable species, *indigens*, nearest in relationship to *oregonensis*, existed. Study of larger series now show that there are actually two species, one of which divides into three geographic races. The characters shown by the penis are by far the most important in distinguishing these.

The present race resembles typical *indigens* closely and in external characters can be distinguished only by the male cerci which do not widen distad. The dorsal lobes of the penis, however, are distinctive, their apices represented by very small rounded projections.

Realizing that the cerci agree with those of *oregonensis* and that the penis is of very similar type, it is evident that *missoulae* represents a condition diverging from *indigens* toward *oregonensis*. I do not, however, feel justified in placing either *indigens* or *missoulae* as a race of that species.

Type.—♂; Missoula, Montana. August 2, 1904. [Hebard Collection, Type No. 1268].

Indistinguishable from typical *indigens* in all external characters except the cercus. Size and form medium. Vertex moderately broad with distinct lateral carinae, its dorsal surface concave. Frontal costa with weak blunt lateral carinae, moderately impressed at median ocellus. Pronotal disk with a fine medio-longitudinal carina on metazona, absent (or rarely very weakly indicated, this more frequent in females) on prozona. Prosternal spine moderately elongate, rather slender, with apex well rounded. Tegmina elongate ovate (with apices varying from broadly to rather sharply rounded, the normal condition intermediate), separated by a brief interval, length very definitely less than that of pronotum. Apex of abdomen moderately thickened. Furcula represented by a pair of small, slender, moderately divergent (varying in paratypes to very feebly divergent) projections, over twice as long (shorter in one paratype) as the width of one of them just beyond the thickened areas from which they spring. Supra-anal plate shield-shaped, median and lateral processes longitudinally concave, the former with concavity broader and weaker distad, transverse carinae absent; lateral margins moderately thickened (this stronger in one paratype) for some distance opposite cercal bases. Cercus with length approximately twice proximal width, curved feebly dorsad; dorsal and ventral margins weakly convergent proximad, nearly parallel mesad, converging and rounding into the truncate distal margin, external surface definitely (to not at all) impressed distad.[7] Penis with ventral lobes[8] prominent, their caudal margins moderately oblique convergent, then vertical to base and briefly separated; parameres acute, projecting over half distance to apices of dorsal lobes; the latter with portions projecting dorsad very small and rounded.[9] Subgenital plate produced in a broad blunt rounded apex which occasionally shows a small median impression.

Allotype.— ♀ ; same data as type. [Hebard Collection].

Very similar to male but larger and more robust. Vertex broader with impression weaker. Tegmina broader but separated by a greater interspace. Prosternal spine shorter, broader and decidedly heavier. Ovipositor apices of medium length and moderately curved, dorsal surface of dorsal valves weakly nodose proximad, the lateral margins acute, the external subcrenulate but very feebly and bluntly toothed proximad.

The measurements of the extremes are given in a series of eight male and fourteen female paratypes bearing the same data as the type and one female paratype from the same locality taken August 11, 1931, by M. W. Sanderson, belonging to the University of Kansas. Length of body ♂ 18. to 19.3, ♀ 22. to 23.7; length of pronotum ♂ 4.7 to 4.9, ♀ 5. to 5.6; caudal width of pronotal disk ♂ 2.8 to 2.9, ♀ 3.5 to 3.8; length of tegmen ♂ 3.7 to 4.2, ♀ 4.5 to 4.8, length of caudal femur ♂ 9.8 to 10., ♀ 11.1 to 12. mm.

Generally dark brown, the paler brown recessive individuals with color pattern weaker. A broad darker postocular band extends to the principal sulcus on the pronotal lateral lobes. Face, ventral portion of pronotal lateral lobes, dorsum of abdomen, three markings on caudal femora and ventral surface buffy or grayish, often very finely tessellate with brown except ventrad. Tegmina unicolorous brown. Caudal femora ventro-internally and ventrad yellowish buff, orange only in a few intensive males, ventro-external portion dull scarlet red, paler in some specimens and yellow buff in the two most recessive females. Caudal tibiae buffy, suffused with brown in the most intensive females, spines black.

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[7] In *indigens indigens* the male cercus is spatulate distad, definitely broader than the median section, the ventral margin rounding more sharply into the distal than does the dorsal margin, the external surface more generally flattened.

[8] In the last paper of this series, Trans. Amer. Ent. Soc., LX, p. 339, (1935), the ventral lobes were termed " the base of the penis and the lateral margins of the shaft ", the dorsal lobes " the surmounting pair of processes or the dorsal processes " and the parameres " the median processes " or the dorsal lobes and parameres " the two pair of dorsal processes ".

[9] In *indigens indigens* the dorsal lobes of the penis are decidedly larger, with lateral surfaces flattened and dorsal outline rounded-angulate in lateral aspect, see plate XIII, figure 3.

Melanoplus indigens indigens Scudder

(Pl. XII figs. 7 and 8; pl. XIII, fig. 3.)

1897. *Melanoplus indigens* Scudder, Proc. U.S. Nat. Mus., xx, p. 211, pl. 14, fig. 4. [♂; Salmon City, Idaho.]

When recording the series here described as *indigens missoulae* in 1928, the material of *payettei* here described from the Payette Lake region in Idaho and the Blue Mountains of Oregon was incorrectly referred to *indigens*, while in the series then described as *oregonensis triangularis*, material of the present insect from Soldier, McCall and Evergreen, Idaho, was also incorrectly referred to that race. These mistakes were mainly due to the fact that, at that time, the (normally concealed) penis was not known to possess characters of the highest value in distinguishing the species and races of the present group.

Under *indigens missoulae* and *indigens digitifer* here described, comparisons are made with *indigens indigens*. The species is plastic and the few external differences which distinguish its races could easily be attributed to individual variation if not associated with the differences shown by the penis.[10]

Specimens Examined.—56; 22 males and 34 females.

MONTANA: Rocky Mountain Divide, IX, 29, 1907, 1 ♂.

IDAHO: Salmon City, VIII, 1883, (L. Bruner), 1 ♂, *type*, [Hebard Cln. Type No. 102]. Morgan Creek in Salmon River Range, VIII, 15, 1928, (Rehn and Hebard): summit of pass, 7575 feet, (Very small colonies in scanty Canadian Zone undergrowth of Lodge-Pole Pine and fir forest), 2 ♂, 4 ♀; upper creek, 7300 feet, (same environment but more undergrowth), 1 ♂, 1 ♀; hillside at 7080 feet, (occasional on open hillside covered with low mountain plants and some sage brush), 3 ♂, 10 ♀; upper canyon, 6650 feet, (locally in sage brush particularly near Aspen thickets), 5 ♂, 12 ♀. Galena Summit, Sawtooth Range, 8750 to 9225 feet, VIII, 17, 1935, (M. Hebard; decidedly scarce on slopes at summit with fine grasses and some sage brush, in grasses and among Hudsonian Zone plants near Fox-Tail Pines and firs), 3♂, 4♀. Mountains north of Soldier, (L. Bruner), 4♂,[11] 3♀. McCall, Big Payette Lake, 5000 feet, VIII, 11, 1910, (Rehn and Hebard; pair only found after long search in heavy conifer forest where only undergrowth was a few grasses and wild strawberry plants), 1♂, 1♀ (atypic). Evergreen in Washington County, 3600 feet, VIII, 12, 1910, (Rehn and Hebard; only specimens found after long search in or near thickets of wild rose and *Spiraea betulifolia* in conifer forest on lower edge of Canadian Zone, with more Western Yellow Pine than higher up), 1♂, 2♀ (atypic).

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[10] As the dorsal lobes of the penis show the greatest amount of differentiation, but in life are somewhat fleshy, it must be remembered that distortion in drying may occur. Such is, however, fortunately a rare occurrence.

The richly colored males from McCall and Evergreen are atypical and may indicate the presence in central western Idaho of an undescribed geographic race. The supra-anal plate and cerci are decidedly shorter than normal while the dorsal lobes of the penis show distinct livergence toward the type developed in *indigens digitifer*. The specimens from Evergreen are, in addition, unusually small.

It is noteworthy that the species was not found below 6000 feet in either the Salmon River or the Sawtooth Ranges.

Melanoplus indigens digitifer new subspecies

(Pl. XII, fig. 9; pl. XIII, figs. 4 and 5.)

1897. *Melanoplus saltatoi* Scudder (in part), Proc. U.S. Nat. Mus., xx, p. 262. [♀; Loon Lake in Colville Valley, Washington.[12]]

1928. *Melanoplus indigens* Hebard (in part), Proc. Acad. Nat. Sci. Phila., LXXX, p. 268. [Bear Mountain, Idaho.]

This race in external characters is apparently indistinguishable from *indigens indigens* except in average differences in the male cercus, which appendage in the present species shows more individual variation than is usual in the genus. The races of *indigens* can indeed be said to be safely distinguished only by the characters shown by the penis and differences from the normal in that organ are here noted for three males recorded as atypical *indigens indigens*.

Typical material of *indigens digitifer* differs from *indigens indigens* in having the dorsal lobes of the penis more elongate, more lateral in position, slanting to their attingent apices, widening gradually distad with lateral surfaces definitely convex (instead of vertical and flattened) and distad finely shagreenous and evenly rounded (without indication of angulation).

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[11] One male in form of the penis shows divergence toward *indigens digitifer*.

[12] This female quite closely resembles the females from Haines, Oregon, except that it is larger than the largest, with tegmina broader and frontal costa with lateral carinae more prominent. Though quite possibly representing the present race, this assignment can not be made with any certainty until males from that region have been secured.

In the Montana and Idaho males some tendency toward *indigens indigens* is shown in the dorsal lobes of the penis having their lateral surfaces less convex and the lateral outline of their apices with weak but appreciable rounded angulation indicated in rare specimens of the Haugan series. More material from other localities in the mountains of Idaho and extreme western Montana is needed to decide the geographic significance of the present insect. It is surprising to find it at the more eastern localities noted, there being apparently little geographic or zonal significance when these are considered in conjunction with the localities from which *indigens indigens* is known.

Type.— ♂ ; Haines, Oregon. July 10, 1931. (R. H. Beamer). [Hebard Collection, Type No. 1269].

Generally as here described for type of *indigens missoulae*, except as follows. Pronotal disk (usually) with medio-longitudinal carina very weakly indicated on prozona (but varying to obsolete there); transverse sulci sometimes (but not always) slightly more distinct. Furcula very feebly divergent (varying in paratypes to moderately divergent). Supra-anal plate with lateral margins showing a moderately decided thickening opposite cercal bases. Cerci with margins more convex in distal portion and resultantly more spatulate, which portion includes over half the cercus and has its outer surfaces impressed, more evenly rounded at apex with ventral margins rounding dorsad distinctly more definitely than in *indigens indigens*.[13] Subgenital plate produced in a heavily binodose apex (the apex in paratypes varying from this condition to transverse and dimpled or broad and bluntly transverse). Dorsal lobes of penis distinctive, as described above.

Allotype.— ♀ ; same data as type. [Heband Collection].

Differs from male as does this sex of *indigens missoulae*. Females of the races of *indigens* are apparently indistinguishable.

The measurements of the extremes in the nine males and ten females from Haines, Oregon, are: Length of body ♂ 17. to 20.5, ♀ 18.5 to 21.8; length of pronotum ♂ 4.8 to 5., ♀ 5. to 5.3; caudal width of pronotal disk ♂ 2.7 to 2.9, ♀ 3.3 to 3.4; length of tegmen ♂ 2.7 to 3.8, ♀ 3.4 to 4.4; length of caudal femur ♂ 10. to 10.9, ♀ 11.8 to 12.3 mm.

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[13] Only in a few of the males from Haugan, Montana, is distal truncation of the cercus shown.

The coloration of the series from Haines, Oregon, is much as in *indigens missoulae* except that the buffy areas show a very weak dull olivaceous tinge, while the caudal femora are dark brown on the external pagina and distad, dull brick red elsewhere externally, but brighter red internally and ventrad in males and in some rich ox-blood red there. Usually richly colored the series show decided variability and the most recessive females from Haugan, Montana, lack all red coloration and are as pale as the most recessive females of *indigens missoulae* discussed under that race.

Specimens Examined.—19 males and 22 females.

MONTANA: Haugan, VIII, 9, 1931, (Beamer, Anderson, Nottingham and Peters), 17♂, 18♀, [Univ. of Kansas and Hebard Clns.]. Taft, VII, 1929, (E. R. Buckell), 1♂, 1♀, [Can. Nat. Cln.].

IDAHO: LoLo Trail on Bear Mountain, 6000 feet, VIII, 1902, (C. V. Piper), 2♂, 3♀, [U.S.N.M. and Hebard Cln.].

WASHINGTON: Loon Lake in Colville Valley, VII, 23, 1882, (S. Henshaw), 1♀,[14] *paratype* of *Melanoplus saltator* Scudder, [Mus. Comp. Zool.].

OREGON: Haines, VII, 10, 1931, (R. H. Beamer), 9♂, 10♀, *type, allotype, paratypes,* [Hebard and Univ. of Kansas Clns.].

Melanoplus payettei new species (Pl. XII, fig. 9; pl. XIII, fig. 6.)

1908. *Melanoplus indigens* Hebard, (in part not of Scudder, 1897), Proc. Acad. Nat. Sci. Phila., LXXX, p. 268. [♂, ♀: Payette Lake Region, Idaho; Blue Mountains, Oregon.]

The discovery of an exceptionally distinctive penis in males of the present insect has come as a great surprise. Generally the resemblance to *indigens* is very close, but now that a distinct species is known to be represented, the following inconspicuous but definite external differences are noted: tegmina averaging broader in both sexes (with consequently narrower interspace) and tapering more definitely in distal half to the apex; male cerci proportionately smaller, not widened distad (the latter a feature, however, which distinguishes *indigens missoulae* as well), and subgenital plate with apex very briefly (instead of prominently) produced.

In the entire series of *payettei* the ventral surfaces of the caudal femora are buffy, very faintly tinged with orange only in males, whereas in the few males of *indigens* from the Payette Lake region those areas are deep or bright nopal red. This feature is, however, known to be often unreliable and in *indigens* a few of the specimens from other parts of its range are colored the same as in *payettei.*

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[14] See footnote 12.

Type.—♂; McCall, Big Payette Lake, Idaho. Elevation 5000 feet. August 11, 1910. (M. Hebard). [Hebard Collection, Type No. 1266].

Generally similar to large individuals of *indigens* except as noted above. Vertex very slightly more produced than is normal in that species, it and the frontal costa as here described for *indigens missoulae.* Pronotal disk with fine medio-longitudinal carina on metazona, still finer but distinct on prozona. Prosternal spine moderately elongate, rather slender, tapering evenly to the rather sharply rounded apex. Tegmina ovate, lateral margins in distal half convergent to the rounded apices, separated by a very narrow interspace, length very definitely less than that of pronotum. Apex of ablomen moderately thickened. Furcula a pair of small, slender, very strongly divergent projections, over twice as long as width from beyond the thickened areas from which they spring. Supra-anal plate shield-shaped, median and lateral portions longitudinally concave, transverse carina absent (but indicated in one paratype), lateral margins thickened in proximal portion but only slightly more so (or not at all) opposite cercal bases. Cercus proportionately distinctly smaller than in *indigens,* length slightly over twice proximal width, nearly straight but directed slightly dorsad of caudad; dorsal margin declivent proximad, then subparallel to ventral margin, distad rounding into the convex apex slightly more broadly than does the ventral margin; distal portion as broad as the median, its entire surface feebly impressed. Penis with dorsal lobes developed into two very large, erect, transverse, adjacent, fleshy plates (see plate XII, figure 10), one minute aciculate pair of parameres visible meso-proximad. Subgenital plate with apex scarcely produced, very weakly and bluntly binodose.

Allotype.—♀; same data as type. [Hebard Collection].

Differs from male as does this sex of *indigens missoulae,* described on page ——. Tegmina similar to those of male (but in some paratypes proportionately smaller, more nearly oval and slightly more widely separated).

The measurements for the extremes in the series (all from McCall except the smallest female, from Evergreen) are: length of body ♂ 20. to 21., ♀ 23.8 to 27.2; length of pronotum ♂ 4.7 to 4.9, ♀ 5.4 to 6.; caudal width of pronotal disk ♂ 2.6 to 2.7, ♀ 3.7 to 3.8; length of tegmen ♂ 4.4 to 3.8, ♀ 4.7 to 5.4; length of caudal femur ♂ 11. to 11.5, ♀ 13.8 to 14.2 mm.

Coloration much as in *indigens missoulae* as described on page 175, except as follows. In the present small series little intensification and no recession is shown. Caudal femora sometimes appearing gray brown with darker oblique suffusions (instead of dark with paler areas as is sometimes the case in *indigens*), internally and ventrad buffy, the ventro-external section with a very faint trace of orange in the majority of the males. Caudal tibiae buffy, usually with a mere trace of a glaucous tinge.

Specimens Examined.—14; 6 males and 8 females.

IDAHO: McCall on Big Payette Lake, 5000 to 5050 feet, VIII, 11, 1910, (Rehn and Hebard; though not numerous the most abundant grasshopper in the dry grasses, wild rose and other bushes in the Western Yellow Pine, Douglas Fir and Western Tamarack forest of the Canadian Zone), 5 ♂, 6 ♀, *type, allotype, paratypes.* Evergreen, 3600 feet, VIII, 12, 1910, (Rehn and Hebard; in rather similar but less boreal environment on lower edge of Canadian Zone), 1 ♀, *paratype.*

OREGON: Foothills of Elkhorn Range in Blue Mountains, 3800 to 4300 feet, VIII, 14, 1910, (Rehn and Hebard; in undergrowth, particularly *Spiraea betulifolia,* of steep pineclad hillsides), 1 ♂, 1 ♀, *paratypes.*

PART VIII. DESCRIPTIONS OF A NEW RACE AND TWO NEW SPECIES

This part includes the descriptions of a new race of *Melanoplus foedus*, which was studied in the work on the Orthoptera of Texas, now in course of preparation by the author, and the description of two unusually interesting new species of the Melanopli, one from the Cascade Mountains in Oregon, the other from the northern Sierra Nevada Mountains of California.

Melanoplus foedus iselyi[15] new subspecies . (Pl. XVII, figs. 1 and 2.)

1907. *Melanoplus foedus* Morse, Carnegie Inst. of Wash., Publ. 68, p. 48. [♂, ♀; Shawnee, Oklahoma; Wichita Falls, Texas.]

1926. *Melanoplus packardii* Rehn in Hubbell, (not of Scudder, 1878), Proc. Oklahoma Acad. Sci., VI, p. 175. [♂, ♀; Fort Sill, Oklahoma.]

1931. *Melanoplus foedus fluviatilis* Hebard (in part,[16] not of Bruner, 1897), Proc. Acad. Nat. Sci. Phila., LXXXIII, p. 187. [Cowley and Barber Counties, Kansas.]

1935. *Melanoplus foedus fluviatilis* Isely, Ent. News XLVI, p. 74. [Western Parker County, Worth Ranck in Palo Pinto County and Hill County, Texas.]

Though in Kansas and Arkansas this race grades into *foedus fluviatilis*, series now before us from Oklahoma and northeastern Texas show such differences in average size and structure, coloration and marking that its racial validity is evident. The more yellow Texas individuals, though the resemblance is purely superficial, look indeed much like the yellowish specimens of *Melanoplus differentialis* (Thomas) which are also present there.

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[15] Named in honor of Professor F. B. Isely, who has aided the author greatly in his studies on the Orthoptera of Texas, now being prepared.

[16] Four specimens then suggested as possibly racially distinct.

From typical *foedus fluviatilis* it is distinguished by the average larger size and more robust form, the buffy or yellow caudal tibiae and the postocular bar which is rarely solid, usually decidedly broken and sometimes subobsolete.

Like in the other races of *foedus* and in the related *packardii* Scudder, the variation in coloration and intensity of the dark markings is often great.

A large series of *foedus fluviatilis* from Kansas averages large for that race, the postocular bar is much more solid and prominent, the caudal femora ventrad and internally are rich orange in most of the dark individuals and buffy as in *foedus iselyi* only in recessive specimens, while the caudal tibiae are glaucous or pink, very rarely buff[17] and never yellow buff as is always the case in richly colored typical examples of the present race. A single female from Barber County, Kansas, is here listed as atypical *foedus iselyi*, being in every way typical of it except that the caudal femora are rich pink.

Type.—♂; Weatherford, Texas. July 31, 1934. (F. B. Isely). [Hebard Collection, Type No. 1291].

Size large for the genus, form graceful but fairly robust. Vertex with surface concave between the prominent lateral carinae, frontal costa at and below the median ocellus similarly concave. Eye less than one and one-half times as long as infra-ocular sulcus. Pronotum with medio-longitudinal carina prominent on metazona, obsolete elsewhere; transverse sulci distinct, averaging slightly more prominent than in *foedus fluviatilis;* caudal margin of disk obtuse angulate produced with apex broadly rounded. Organs of flight fully developed, well surpassing apices of caudal femora. Prosternal spine erect, elongate cylindro-conical, with apex sharply rounded. Furcula represented by small, strongly (rarely varying to moderately) divergent, slender, tapering fingers, each several times as long as its width beyond the thickened base. Supra-anal plate rather broadly shield-shaped; its lateral margins moderately elevated to opposite the cercal bases, thence straight convergent to the moderately acute apex; medio-longitudinal concavity bounded by carinae which extend to near apex, lateral portions concave. Cerci comparatively small, over twice as long as broad, tapering moderately in slightly over proximal half, remainder spatulate, expansion moderate with dorsal and ventral margins rounding into the truncate distal margin, the external surface in that section impressed. Penis as characteristic of the species; tubular section with a wide meso-caudal cleft, the dorsal margins forming two heavy dorsal (apical) lobes (the dorsal lobes) which do not surpass the lateral margins; from within project for some distance two fleshy, divergent fingers (the proximal pair of parameres), each having a delicate vertical lamella on its caudal surface which terminates abruptly proximad above the erect, usually concealed, elongate, vertical, plate-like pair of parameres, the apex of each being chitinous and concave. Subgenital plate ample, produced mesad to a sharply rounded apex.

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[17] The few specimens known with caudal tibiae buff are all probably teneral or discolored.

Allotype.—♀; same data as type. [Hebard Collection].

Longer and more robust than male. Organs of flight fully as caudate. Ovipositor apices short, the dorsal pair strongly recurved, dorsal surface with distal portion concave, its lateral margins sharply raised and a similar cutting transverse ridge joining them and separating the distal from the flattened proximal dorsal portion.

General coloration primuline yellow (a buffy yellow) in Weatherford series, all but one from Palo Pinto County and specimen from Hill County, Texas. Head and cephalic limbs immaculate except for mere traces of a postocular suffusion and a disto-external fleck of dark brown on median femora. Pronotum with lateral lobes showing a dorsal line and two sulci for some distance brown (this the remaining traces of a broad postocular bar). Caudal femora with dorsal carinae and ventro-external carina distad with scattered dark brown dots, internal portion of dorsal surface with three dark brown suffused areas (the remnants of broad transverse bands) and distal arch and base of genicular areas dark brown. Tegmina pale and vitreous distad. Caudal femora internally and ventrad more richly colored, light orange yellow.

The male from Kingfisher County, Oklahoma, and the female from Colorado County, Texas, are decidedly less yellow, a dull buffy yellow, with broad but broken postocular bar on pronotal lateral lobes and transverse bars on dorsal surface of caudal femora incomplete but suggested throughout.

A male from Palo Pinto County, Texas, is similar but dirty buff in general coloration.

All of the other specimens (including Morse's series from Wichita Falls) are more like the latter, or generally buff tinged with tawny or wood brown, the postocular bar varying from faintly suggested to nearly solid but never as conspicuous as in typical *foedus fluviatilis*, the dorsal transverse bars of caudal femora crossing that surface or limited to its inner portion. The caudal tibiae range from primuline yellow to buffy.

Though ranging in general coloration from light yellow to brown, a distinctive and similar general facies is shown, widely different from that of the other races of *foedus*.

While *foedus foedus* Scudder is particularly apt to be found in restricted sand areas but often occurs as well on sandy plains or river bottoms to the west, both *foedus fluviatilis* and *foedus iselyi* are decidedly more local in distribution and are probably largely confined to sandy areas along rivers, streams and lakes, in the regions in which they occur. It is evident that the former is a northeastern and the latter a southeastern race.

♂	Length of body	Length of pronotum	Caudal width of pronotal disk	Length of tegmen	Length of caudal femur
Cowley County, Kansas.	29.	6.8	3.7	23.5	15.7
Foss, Oklahoma.	31.5	7.2	3.8	25.1	17.
Fort Sill, Oklahoma. (2)	25. -31.5	5.7-7.2	3.1-3.9	20.7-26.6	13.8-16.7
Weatherford, Texas. *Type*. ...	31.	7.7	4.	27.	16.8
Palo Pinto County, Texas. (6)	29.5-32.8	6.9-7.8	3.8-4.	25.6-27.1	15.5-17.2
Hill County, Texas.	27.4	6.8	3.5	22.7	16.7
♀					
Barber County, Kansas. (Atypic).	35.7	7.7	4.5	26.8	19.4
Foss, Oklahoma.	30.7	7.4	4.3	24.5	17.2
Chickasha, Oklahoma.	35.7	7.7	4.4	26.7	19.8
Weatherford, Texas. *Allotype*.	34.8	7.9	4.7	28.5	18.7
Vernon, Texas.	31.8	7.2	4.2	25.7	18.2
Colorado County, Texas.	32.7	7.3	3.9	26.8	16.8

Specimens Examined.—58; 31 males, 26 females and 1 immature individual.

KANSAS: Cowley County, 1114 feet, 1916, (R. H. Beamer), 3♂. Barber County, 1468 feet, (R. H. Beamer), 1♀, (atypic).

OKLAHOMA: Kingfisher County, VI, 1925, (T. O. Stringer), 1♂, Shawnee, 1000 feet, VIII, 26, 1905, (A. P. Morse), 10♂,[18] 12♀, [Mus. Comp. Zool.].

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[18] Typical except that one male has pink, two females deep and eight females pale glaucous caudal tibiae.

Foss, VII, 1916, 1♂, 1♀. Chickasha, IX to X, 1928, (M. J. Brown), 1♂, 3♀, 1 juv. ♀, [Hebard and Brown Clns.]. Fort Sill, X, 22 to XI, 10, 1918, (T. H. Hubbell), 2♂, 2♀, [Acad. Nat. Sci. Phila. and Hebard Clns.].

TEXAS: Weatherford, VII, 31, 1934, (F. B. Isely; low lying weedy field, fifteen miles west of), 3♂, 1♀, *type, allotype, paratypes.* Worth Ranch, Palo Pinto County, VIII, 1, 1934, (F. B. Isely; on Brazos River), 6♂, *paratypes,* [Hebard and Isely Clns.]. Hill County, XI, 30, 1933, (F. B. Isely; on Brazos River), 1♂, *paratype.* Wichita Falls, Texas, 950 feet, VIII, 15 and 16, 1905, (A. P. Morse), 3♂, 4♀, [Mus. Comp. Zool.]. Vernon, VIII, 31, 1932, (F. B. Isely), 1♂, 1♀. Colorado County, IX, 5, 1927, (J. C. Bradley), 1♀.

Dendrotettix hesperus new species

(Pl. XIII, figs. 7 to 9; pl. XVII, fig. 3.)

Examination by the author of a very dense conifer forest, largely of spruce, on the western ridges of the Cascade Mountains in central Oregon at approximately a thousand feet below and just west of McKenzie Pass, revealed the presence there of a single brachypterous Melanoplid and a female of *Trimerotropis suffusa* Scudder.

The former insect was seen to represent an unusual type, and vigorous efforts were made to find a male in the bushy undergrowth (with practically no grasses or plants) of the forest twilight where the first specimen had been located. Close general search, of necessity local due to lack of sufficient time, failed completely. It can only be assumed that the individual secured, now found to be representative of a striking new species of the genus *Dendrotettix,* was a stray into an unfavorable environment from some nearby colony and that other colonies might have been located, but only after very long search, probably in brushy areas (for there is every reason to believe that the insect is thamnophilous) on the borders of or in openings in the very dense forests.

Recent revision of the genus and its close allies by Rehn and Rehn[19] enables me not only to place the present female with certainty as to genus, but also to describe the species satisfactorily from that sex alone; it is indeed the female sex which affords the most valuable generic diagnostic features as well as showing excellent specific characters in both the present species and its allies.

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[19] Trans. Amer. Ent. Soc., LXII, pp. 6 and 22, with 11 figures, (1936).

The presence of a species of *Dendrotettix* in the Cascade Mountains of the Northwest comes as a great surprise, the genus not having been found previously west of southeastern Kansas and east-central Texas, or north of the former and northeastern Illinois. Nearest known related form in the Northwest is an isolated species of *Zubovskya* Dovnar-Zapolskij, present in the mountains of central-western Oregon.

Generally strongly suggesting *Dendrotettix zimmermanni* (Saussure), the present insect is easily separated by the less enlarged head with eyes less prominent and vertex slightly more produced, tegmina (though very similar in other respects) with humeral vein irregularly and poorly indicated proximad and not close to the prominent discoidal vein but the mediastine vein very conspicuous, the cross-veinlets heavier and more numerous, distal margin of ultimate tergite acute, coloration more uniformly dark with paler markings much more obscured, deep pink ventral surface of the caudal femora and yellow buff caudal tibiae.

The presence of a prominent and percurrent mediastine vein on the tegmina and rich coloration of the ventral portions of the caudal femora suggest instead the otherwise very much more widely separated *Dendrotettix quercus* (Packard).

The insect differs from *Appalachia hebardi* Rehn and Rehn much as it does from *zimmermanni*, but it differs still further in having the pronotal lateral lobes deeper, the tegmina broader with their disto-dorsal margin not regularly curved and the ovipositor valves much deeper with dorsal margins of dorsal pair much more strongly sigmoid. The caudal tibiae are, however, much the same color in these species and the ultimate sternite is acute-produced distad (this eliminating that character as of value in distinguishing *Appalachia* from *Dendrottetix*).

Type. — ♀ ; Alder Springs below and west of McKenzie Pass, Cascade Mountains, Lane County, Oregon. Elevation 3700 feet. August 24, 1928. (M. Hebard). [Hebard Collection, Type No. 1300].

Size medium, form robust. Head not proportionately as large nor eyes as protruding as is normal in this genus, more nearly normal for the Melanopli as in the genus *Zubovskya* but with interocular space broader. Interocular space broad, equalling the greatest dorsal ocular width, fastigium very slightly broader than wide, deplanate declivent; frontal costa very slightly narrower at dorsal extremity than just below, lateral carinae fine but distinct, frontal costa narrowed and decidedly impressed at and just below median ocellus, then rapidly subsiding into face. Eyes normal, not conspicuously protuberant. Antennae moderately elongate. Pronotum truncate cephalad and caudad, the latter margin showing the barest trace of bilobation; disk feebly convex and smooth on prozona and mesozona, with medio-longitudinal carina briefly indicated only cephalad, very feebly subtectate on metazona to the decided medio-longitudinal percurrent carina with surface thickly and regularly impresso-punctate; transverse sulci prominent but not as deep as in *quercus;* lateral lobes with dorsal length approximately one and one-quarter times greatest depth. Prosternal spine with large base, then strongly constricted and produced in a short slender apical portion with tip rounded. Tegmina represented by small oval lateral pads, margin more convex ventro-distad and distad than dorso-distad; longitudinal veins fairly regular with mediastine and discoidal the most prominent and humeral not decided or nearer the latter than those above it, transverse veinlets numerous, prominent and quite regular. Wings the merest rudiments, concealed by the tegmina. Tympana large, broad, also covered by the tegmina. Ovipositor valves of more normal type than in *Appalachia* Rehn and Rehn; dorsal pair broad, with dorsal margins strongly sigmoid and dorsal surface proximad deplanate and not abruptly cut off from the concave distal portion. Limbs delicate and not robust. Caudal tibiae with ten or eleven spines, both externally and internally.

Tegmina and limbs burnt umber (dark brown), the body still darker; caudal femora with merest traces of two very slightly paler chevron-shaped transverse bands. Ventral surface of body brownish buff. Caudal femora with ventral surface acajou red, paling internally. Caudal tibiae yellow buff, with spines and spurs black tipped.

Length of body 27.7, length of pronotum 5.8, greatest width of pronotal disk (caudad) 4.8, length of tegmen 4., greatest tegminal width 1.9, least (meso-proximal) distance between tegmina 3.2, length of caudal femur 11.9, width of caudal femur 2.65 mm.

Asemoplus sierranus new species (Pl. XVI, figs. 3 to 5.)

This species is closely related to *Asemoplus montanus* (Bruner) (Pl. XVI, figs. 1 and 2), in general appearance being decidedly more similar to that species than to any other of the genus. It differs in the normal and consequently less enlarged head and pronotum, the much less broadly blunt apex of the fastigium and much narrower frontal costa which extends well below the median ocellus and is there moderately sulcate, the absence of extensive strikingly pale pronotal markings and medio-longitudinal dorsal abdominal stripe, longer cerci which are decidedly narrower proximad and broader distad, somewhat differently proportioned penis and differently shaped subgenital plate.

Females are smaller than that sex of *montanus*, differing quite as decidedly as the opposite sex in proportions of head and pronotum, narrower fastigium and frontal costa and coloration.

Type. — ♂ ; Harkness Peak, Plumas County, California. Elevation 8000 to 9200 feet. August 20, 1922. (M. Hebard). [Hebard Collection, Type No. 1301].

Size rather small, form rather slender, averaging smaller and less robust than *montanus*. Head and pronotum normal, not enlarged out of proportion to size of body. Interocular space very slightly less than one-half dorsal width of the large but not unusually protruding eyes. Fastigium weakly impressed, transverse but decidedly smaller and slightly more produced than in *montanus*. Frontal costa different as noted above. Pronotum with dorsum curving into lateral lobes with definition between these parts little indicated; medio-longitudinal carina very feeble cephalad, subobsolete mesad, distinct across metazona; transverse sulci distinct but decided only on lateral lobes; caudal margin of disk transverse, showing the faintest trace of bilobation; lateral lobes distinctly more elongate than in *montanus*, depth equal to length of prozona and mesozona. Prosternal spine moderately slender, tapering to the rounded apex. Tegmina represented by small narrowly oval pads which reach the caudal margin of the large tympana. Furcula represented by very slight projection of the weak thickenings of the tergite. Supra-anal plate shield-shaped, mesoproximal and lateral concavity pronounced, a small but prominent node present laterad opposite cercal bases. Cerci elongate, gradually narrowing to distal fourth, there moderately falcate and also curved moderately inward, apex very slightly widened with dorso-distal margin curving down to the sharply acute-angulate ventro-distal angle. Penis similar to that of *montanus* but exposed portions narrower and longer and dorso-lateral margins of dorsal lobes less flaring. Subgenital plate shorter than in that species, deeper lateral but only slightly more produced mesad and there terminated in a very weak, low, blunt tubercle.

Allotype. — ♀ ; same data as type. [Hebard Collection].

Larger and decidedly more robust than male, differing from females of *montanus* as noted above. Agrees with male except as follows. Pronotal sulci even weaker dorsad. Caudal margin of pronotal disk feebly subbilobate. Prosternal spine shorter, stouter and blunter. Ovipositor normal.

General coloration of male dull dark brown. Pronotal lateral lobes sometimes slightly (rarely distinctly) paler, buffy brown ventrad below two large shining blackish brown areas and often with a buff fleck dorso-cephalad of these. Tegmina unicolorous or sometimes with veins slightly paler than the ground coloration. Abdomen often definitely paler, more buffy, but never showing a medio-longitudinal dorsal pale band. Cephalic and median limbs buffy brown, caudal femora externally similar or somewhat paler but with genicular areas and margins of external pagina (this usually weaker on ventral margin of that area) blackish brown. Internal and ventral surfaces of caudal femora, ventral surface of body and caudal tibiae yellow buff (probably usually clear light yellow in life in the two latter areas), spines and spurs black.

Females are even more uniform in coloration and usually darker, with a short dorso-cephalic oblique buffy line on pronotal lateral lobes alone more conspicuously developed, the other paler brown areas usually generally darkened.

Length of body ♂ 16.6 to 18.4, ♀ 20.1 to 23.7; length of pronotum ♂ 3.7 to 4., ♀ 4.4 to 4.7; caudal width of pronotal disk ♂ 2.3 to 2.7, ♀ 3.8 to 4.3; length of tegmen ♂ 2.7 to 2.8, ♀ 3.1 to 3.8; length of caudal femur ♂ 8.3 to 9.2, ♀ 10.2 to 10.8 mm.

A series of twenty-nine males and eleven females, paratypes, bear the same data as the described pair. These were found in the open forest of Sugar Pine, in chaparral mainly composed of Manzanita and *Purshia tridentata* (Pursh) but particularly in areas carpeted with a low chinquapin; very scarce on the south slopes but common on the summit of Harkness Peak, which is an extinct volcanic cone not distant from Mount Lassen. Males were found to leap quite vigorously but rarely attempted hiding down in the bushes and so were easier to capture than such thamnophilous insects as *Aeoloplus*, which are adepts at hiding as well as at leaping. The females were more difficult to locate, but were very sluggish and clumsy and consequently easy to capture when once seen.

PART IX. A REVISION OF THE GENUS APTENOPEDES

APTENOPEDES Scudder

1877. *Aptenopedes* Scudder, Proc. Boston Soc. Nat. Hist., XIX, p. 83. [Genotype, selected by Scudder in 1897.—*Aptenopedes sphenarioides* Scudder.]

This genus is peculiar to the lowlands of Georgia, extreme southeastern Alabama and Florida. Some of the species are widespread through the undergrowth of the pine forests in particular, but also in the open in many types of natural undergrowth, over the Saw Palmetto flats and in the beach vegetation on the upper levels of the sea beaches. Still other species are now known which are much more local in distribution, limited to xeric areas of sandy scrub.

Three species were originally described, *sphenarioides, rufovittata* and *aptera,* of which the second was made a synonym of the first by Rehn and Hebard in 1916.[20] In 1902 Rehn described *clara,* which was placed as a geographic race of *sphenarioides* by the present author in 1915.

In 1920 the capture of remarkably large specimens on the rare Silver Palm, *Coccothrinax argentea* Lodd, in tropical Florida led the author to believe that a distinct race or species from the one found generally in the pine woods of that region might be represented. Laboratory examination, however, showed them to be identical except for size.

In 1930 and 1934 receipt of material found to include three new species led to further investigation, particularly as examination of the series which had been recorded as *aptera* by Rehn and the author, substantiated information which T. H. Hubbell had written me to the effect that that species divided into several races. Not until the present time has it been possible to examine the very large series of *sphenarioides* which has been assembled by Rehn and Hebard, and that is now found to include an undescribed race as well as series from certain areas which indicate definite progress toward the development of still other geographic races, the differentiation in which has not, in my opinion, as yet reached a degree sufficient to warrant nominal recognition.

The presence of so many species and races peculiar to so small an area shows that an unusual amount of plasticity once existed in the stock, which resulted in many changes and that a number of these have since become fixed. Of the species, only *sphenarioides* and *aptera* extended their distribution over much the greater part of the region occupied by the genus. These are not corresponding conditions occupying the same niche in the biota of the region, as both are often present at the same place even in the same environment; *sphenarioides* is, however, much more generally distributed, *aptera* apparently preferring slightly more xeric conditions and particularly associated with oak shoots and dwarf oaks in the undergrowth where it occurs. Only in central western and southwestern peninsular Florida is *aptera* supplanted by a similar appearing species, *hubbelli*, in which the penis plainly shows that higher than racial status exists. In addition, the particularly xeric areas of sandy scrub in peninsular Florida are, in different limited areas of quite similar environment, inhabited by three additional strikingly distinctive species.

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[20] By selection of the described (immature) female as type, the four males originally described as *rufovittata* actually representing *aptera.*

Throughout the Sabalian Zone[21] *Aptenopedes* is known except in the lowlands of South Carolina and southeastern North Carolina (but briefly invading the Lower Austral Zone in central eastern Georgia). Numerous assemblages of species and races peculiar to that Zone are likewise encountered in the Puer Group of the genus *Melanoplus*[22] and in the genus *Belocephalus*.[23]

Contrary to Scudder's statement, none of the species of *Aptenopedes* are actually apterous, all having minute, vestigial, scale-like tegmina, except *sphenarioides* and *robusta*, in which the tegmina are very small and very narrow, but extend to or across the face of the large tympanum.

The male subgenital plate (more accurately termed the genital lobe of the ninth sternite) is reduced externally to a narrow collar beyond the distal margin of the very large ninth sternite, revealing dorsad a large pallium. When the pallium is drawn back and the subgenital plate is deflexed, however, the latter is found to be developed internally in a very unusual manner. Large fleshy lobes are attached to it dorso-laterad, hinged to it so that they can swing upward and outward. This hinging is accompanied by intricate folding in *sphenarioides*, but is much more simple in the other species.

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[21] Proposed by Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1916, p. 102.

[22] Hubbell, Univ. of Michigan, Mus. Zool. Misc. Publ. 23, pp. 1 to 64, (1932).

[23] Hebard, Trans. Amer. Ent. Soc., LII, pp. 147 to 186, (1926).

The natural sequence and range of the species and races is as follows:[24]

aptera simplex new subspecies. Northeast coast of Florida.

aptera borealis new subspecies. Lowlands of eastern and southwestern Georgia and northern Florida (except narrow northeast coastal areas), as far west as Carrabelle.

aptera aptera Scudder. Central peninsular Florida (except southwestern area).

aptera saturiba new subspecies. Xeric sandy areas in northeastern central peninsular Florida.

aptera coquinae new subspecies. Southwestern peninsular Florida (and probably Big Pine Key).

hubbelli new species. Western peninsular Florida (except northeastern area).

nigropicta new species. Xeric sandy areas northwest of Lake Okeechobee in peninsular Florida.

robusta new species. Xeric sandy areas near coast east of Lake Okeechobee in penisular Florida.

sphenarioides apalachee new subspecies. Southwestern Georgia, extreme southeastern Alabama and adjacent Florida to Gulf Coast, (atypic in lowlands of southeastern Georgia and northeastern Florida).

sphenarioides sphenarioides Scudder. Central peninsular Florida.

sphenarioides clara Rehn Southern peninsular Florida and Florida Keys.

Key to the Species of the Genus Aptenopedes

1. Form comparatively robust, female cylindrical but blunt cephalad. Male subgenital plate broader, without proximo-lateral sulcus on each side. Male with inner flaps of subgenital plate folding in a less complex manner and no conspicuous inner caudal marginal tissue developed. (Male cerci simple, not showing striking differentiation. Male paraprocts simple.) 2

   Form definitely more slender, female more slenderly cylindrical and not nearly as blunt cephalad. Male subgenital plate very narrow, with a nearly vertical proximal sulcus on each side. Male with inner flaps of subgenital plate folding in a complex manner and a conspicuous inner triangular caudal marginal tissue also present on that plate. (Both sexes with small, narrow, lateral, pad-like tegmina. Both sexes with postocular bands margining pronotal disk and continued on tegmina. Male cerci showing striking racial differentiation. Male paraprocts simple or bearing a tubercle. Penis simple, with four minute adjacent erect apices of parameres projecting. Caudal tibiae pale; glaucous, greenish or pink, sometimes light pink proximad and light glaucous distad.) ....Races of *sphenarioides* 9

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[24] See also map on plate XVII.

2. Both sexes with microscopic minute scale-like vestigial tegmina. 3
   Both sexes with small, narrow, lateral, pad-like tegmina. (Form decidedly robust. Both sexes with caudal tibiae pink. Female lacking pale lateral marginal bands on pronotal disk. Penis very distinctive (Pl. XVI, figs. 6 and 7).) Local; on east coast of peninsular Florida opposite Lake Okeechobee. ....*robusta* new species
3. Male without blackish brown markings on pronotum. (Form moderately robust. Caudal tibiae glaucous, in females changing to purplish or pink dorsad (the latter condition rare in the north, usual in the south).) 4
   Male with the transverse and short lateral sulci of the pronotum strikingly blackish brown. (Form decidedly robust. Caudal tibiae of males deep glaucous, of females dull glaucous becoming purplish pink dorsad. Female lacking pale lateral marginal bands on pronotal disk. Penis distinctive (Pl. XV, figs. 9 and 10).) Local; in central peninsular Florida northwest of Lake Okeechobee.
   nigropicta new species
4. Female lacking pale lateral marginal bands on pronotal disk. Penis very different from type developed in *sphenarioides*. 5
   Female with pale lateral marginal bands on pronotal disk. Penis distinctive (Pl. XV, figs. 7 and 8), showing much closer agreement with the type developed in *sphenarioides* than in the otherwise more generally similar species, (the dorsal lobes, however, developed into small specialized horizontal lobes and the dorsal pair of parameres lamellate). All but northern portion of western peninsular Florida.
   hubbelli new species
5. Lateral pronotal and medio-longitudinal abdominal bands whitish (varying to yellowish buff only in occasional specimens of *aptera coquinae*[25]). 6
   Lateral pronotal and medio-longitudinal abdominal bands orange (sometimes varying individually to buffy). Penis distinctive (Pl. XV, fig. 1). Central peninsular Florida. ....*aptera aptera* Scudder
6. Dorsal lobes of penis not strikingly bilobate. 7
   Dorsal lobes of penis strikingly bilobate (Pl. XIV, figs. 4 and 5). Lowlands of eastern and southwestern Georgia and northern Florida (except east coastal strip) west as far as Carrabelle.
   aptera borealis new subspecies
7. Dorsal lobes of penis less chitinous, without prominently projecting processes (Pl. XIV, figs. 1 to 3). Northeast coast of Florida.
   aptera simplex new subspecies
   Dorsal lobes of penis more chitinous and darkened, with prominently projecting processes. 8

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[25] Note that in *hubbelli* these markings vary individually from light yellow buff to rich orange.

8. Dorsal lobes of penis with a prominent dorsal finger and no corresponding ventral projection (Pl. XV, fig. 3). Dorsal pair of parameres not enlarged distad (Pl. XV, fig. 2). Northeastern portion of central peninsular Florida (probably local). ..*aptera saturiba* new subspecies
   Dorsal lobes of penis with a ventral as well as a dorsal projection or finger (Pl. XV, fig. 5). Dorsal pair of parameres decidedly enlarged distad (Pl. XV, figs. 4 and 6). Southeastern penisular Florida.
   aptera coquinae new subspecies
9. Male pseudosternite armed with a single spine mesad on each side (Pl. XVI, fig. 10; atypic " C ", fig. 11). (Male cerci short, with apices blunt (Pl. XVI, fig. 8; atypic " A ", fig. 9). Paraprocts armed with a tubercle in typical and atypic " A " conditions.) Lowlands of eastern and southwestern Georgia, extreme southeastern Alabama and northern Florida west to DeFuniak Springs.
   sphenarioides apalachee new subspecies
   Male pseudosternite armed with a lamella or with irregular lobes mesad on each side. 10
10. Male cerci simple, moderately falcate distad (Pl. XVI, fig. 12). Male pseudosternite with its lateral productions distinctive (Pl. XVI, fig. 13; atypic " E ", fig. 14). Central peninsular Florida.
    sphenarioides sphenarioides Scudder
    Male cerci sigmoid, with over distal half strikingly falcate (Pl. XVI, fig. 15). Male pseudosternite with distinctive, irregular, trilobate lateral productions (Pl. XVI, fig. 16). Southern peninsular Florida.
    sphenarioides clara Rehn

The majority of species and races of *Aptenopedes* may be recognized without examination of the normally concealed male genitalia. Moreover, once the characters of the penis are known, the type represented in a specimen may often be recognized merely by observation of the manner in which the pallium is elevated over the tip of that organ. I had, indeed, hoped that the structure of the portions of the penis, exposed when that organ is extruded, would alone require study, these being easily exposed by relaxing a specimen, deflexing the subgenital plate and at the same time working the pallium back and then down. The discovery that a very different pseudosternite distinguishes certain of the races of *sphenarioides* has necessitated a much more elaborate operation.

When the specimen is relaxed, the subgenital plate deflexed and the pallium worked back, the penis is free. A dissecting needle may then be inserted just before the penis to force it out, or just under it (from behind) to work it upward, thus stretching the membranes at the base of the penis to their full extent. The chitinous pseudosternite lies across the anal chamber proximad and is then sometimes visible, but to see both its dorsal and ventral processes the dissecting needle must be driven down behind it and then forward under it. By working this needle carefully so that it pushes against the pseudosternite from below, that organ may be slowly forced upward and slightly caudad, when it will rotate suddenly dorsad, exposing both its dorsal and ventral processes. It may then be left resting across the top of the large proximal portion of the ninth sternite, just beyond the apices of the epiprocts and supra-anal plate. Though these normally concealed organs are thus left in an unnatural position, I prefer this method to dissecting them out entirely. Such very small parts, if mounted on a slip with the specimen or separately, are easily lost or misplaced.

These parts of the male genitalia are mainly named in conformity with R. E. Snodgrass,[26] but I have used "penis" instead of "aedeagus" and "pseudosternite" in place of "epiphallus" in conformity with the first important study of these structures by E. M. Walker[27] and Hubbell's Revision of the Puer Group of the genus *Melanoplus* and recent Monograph of the Ceuthophili.

Aptenopedes aptera simplex new subspecies (Pl. XIV, figs. 1 to 3.)

This race is as yet known only from near the Atlantic Coast just south of the St. Johns river in northeastern Florida, the present series having been reported as *aptera* by Rehn and Hebard in 1907 and 1916. No adult males have been secured in extreme southeastern Georgia, so that although Rehn and Hebard reported the species from St. Marys and Cumberland Island, the race represented can not yet be determined.

The development of the dorsal lobe of the penis affords much the most striking character to distinguish the present race.

Type.—♂; Pablo Beach, Florida. August 11, 1905. (Rehn and Hebard). [Hebard Collection, Type No. 1292].

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[26] Smithsonian Misc. Coll., CXIV, No. 6, (1935).

[27] Ann. Ent. Soc. Amer., XL, pp. 1-76, (1922).

Generally similar to *aptera aptera* Scudder. Size small, form moderately robust for the species. Head moderately large in proportion to size of body, vertex very small, frontal costa in dorsal aspect very broad and almost transverse in outline, frontal costa strongly sulcate throughout. Eyes large, deep and prominent. Pronotum dorsad and laterad, pleura, mesonotum and metanotum thickly and shallowly impresso-punctate. Tegmina vestigial, represented by minute inconspicuous scales, which project only as far as mesad on mesonotum. Tympana large. Prosternal spine elongate cylindro-conical with apex rounded. Furcula represented by a pair of minute divergent fingers, each scarcely longer (individually varying to no longer) than wide. Cercus simple, slightly over twice as long as broad, tapering to the acute apex, distad with dorsal margin feebly convex and ventral margin almost straight, very faintly concave. Supra-anal plate shield-shaped (in some paratypes rather narrow, with lateral margins weakly convergent, then rounding sharply into the only slightly produced distal portion), these margins not at all (to slightly in paratypes) thickened proximad, medio-longitudinal sulcus present only in proximal half but deep, lateral portions concave. Paraprocts large, simple. Eighth sternite very large. Subgenital plate represented by a narrow chitinous ring bounding that sternite caudad, which is only a little broader mesad than laterad, bearing within dorso-proximad on each side a large fleshy rounded flap which normally rests over the base of the penis, but springs upward and outward when that organ is extruded. Pseudosternite with dorsal lobes each having a stout short inner finger and an outer ridge which projects less. Penis with very large base, each of dorsal lobes shagreenous, their lateral margins converging moderately dorsad then nearly straight so that very weak marginal concavity is shown. These lobes are flattened and not at all bulbously bilobate as is the case in *aptera borealis;* dorsal pair of parameres greatly enlarged and specialized, in dorsal aspect appearing as adjacent, shagreenous, rounded, wedge-shaped surfaces much as in *aptera borealis* but narrower (decidedly broader in males from San Pablo).

Allotype.—♀; same data as type. [Hebard Collection].

Much larger and decidedly more robust than male. Distinguishable from immatures by the perfectly developed ovipositor valves and (from all immatures except the last instars) by the minute, scale-like tegmina. Prosternal spine heavier. Ovipositor valves with apices moderately elongate, the dorsal pair recurved, their external margins irregularly dentate, coarsely so distad, a transverse dorsal flange delimiting distal portion at base, the surface of which portion is strongly concave proximad.

General coloration delicate green in life, usually fading to yellow-brown or brown in drying, but a brown color phase also occurs. Males with lateral margins of pronotal disk and abdomen medio-longitudinally dorsad with moderately broad bands of white or pinkish white, the former suffused ventrad narrowly, the latter margined with a suffusion of blackish brown. Females with these markings always absent on pronotum, often weakly indicated on abdomen. Mouthparts, supra-anal plate of male (entirely or medio-longitudinally only) and genicular areas of caudal femora pinkish brown, genicular arches of latter blackish brown. Caudal tibiae deep glaucous, caudal tarsi rich pink.

The extremes shown by the series (all from paratypes) measure: length of body ♂ 16.2 to 18.7, ♀ 22.8 to 25.7; length of pronotum ♂ 3.5 to 4.3, ♀ 5.2 to 5.4; caudal width of pronotal disk ♂ 2.7 to 2.9, ♀ 3.9 to 4.7, length of caudal femur ♂ 8.8 to 10., ♀ 11.3 to 12.2 mm.

Specimens Examined. — 58; 33 males, 22 females and 3 immature individuals.

FLORIDA: Atlantic Beach, VIII, 24 and 25, 1911, (Rehn and Hebard), 3♂, 4♀, *paratypes.* Pablo Beach, VIII, 11 to 13, 1905, (Rehn and Hebard; particularly in sandy Saw Palmetto scrub, associated with *Aptenopedes sphenarioides appalachee* here described, atypic "B"), 28♂, 15♀, *type, allotype, paratypes,* 1 juv. ♂, 2 juv. ♀. San Pablo, VIII, 13, 1905, (Rehn and Hebard; in undergrowth of pine woods) 2♂, 3♀.

Aptenopedes aptera borealis new subspecies (Pl. XIV, figs. 4 to 9.)

The present race has been recorded as *aptera* from numerous localities in Georgia and northern Florida (except the narrow coastal section inhabited by *aptera simplex* here described). It inhabits the lowlands of Georgia north to Groveland, Jesup, Homerville and Bainbridge; west to the latter, Woodville and Carrabelle, Florida, and in peninsular Florida south to Pomona (apparently, as females only were taken there), Ocala and Cedar Key. A series from Kissimmee suggests discontinuous distribution, as the present race is not present at a number of localities to the north where material has been secured.

Type. — ♂ ; Bainbridge, Georgia. September 5 and 6, 1915. (Rehn and Hebard); [Hebard Collection, Type No. 1293].

Generally similar to *aptera simplex* here described, differing signally in having each of the dorsal lobes of the penis very strongly bilobate. Size averaging larger and form very slightly more robust than in *aptera simplex* (but marked difference in the average size is shown by different series, apparently irrespective of geographic distribution. The material from Jacksonville, Gainesville, Archer, Newberry and Ocala averages very large; a large series from Kissimmee small, no larger than the average for *aptera simplex.* Moreover the larger specimens appear to average slightly more robust, the smaller more slender). Pronotum, tegmina, tympana, prosternal spine, cercus, supra-anal plate (except that a thickening or tooth is often present proximad on the lateral margins), paraprocts, subgenital plate and pseudosternite as described for *aptera simplex.* Furcula very similar, but projecting portions no longer than wide. Penis of similar type but with dorsal lobes each strikingly developed into two large, shagreenous, approximate, bulbous lobes of which the ventral is the larger, while the dorsal pair of parameres have their dorsal surfaces broader.

Allotype.—♀; same data as type. [Hebard Collection].

Indistinguishable from this sex of *aptera simplex,* (but averaging larger and slightly more robust).

Coloration much as described for *aptera simplex,* the males apparently more often with margins of medio-longitudinal abdominal stripe pinkish brown and entire apex of abdomen pink. The males from Ocala have the brown suffusions more extensive, while the pronotum usually has a medio-longitudinal brown line, rarely the pale medio-longitudinal abdominal band with its lateral suffusions continued to near the cephalic margin of this tergite. In the present race the caudal tibiae are usually deep glaucous, sometimes paler and sometimes have the dorsal surface purplish or pinkish.

The following extremes in measurements are shown by the series.

♂	Length of body	Length of pronotum	Caudal width of pronotal disk	Length of caudal femur
Bainbridge, Georgia. *Type.* ..	20.8	4.6	3.2	11.7
Ocala, Florida.	21.8 to 23.7	4.9 to 5.	3.3 to 3.4	12.2 to 12.3
Kissimmee, Florida.	15.7	3.1	2.4	8.2
♀				
Bainbridge, Georgia. *Paratype.*	26.2 to 28.8	6. to 6.1	5. to 5.3	13.3 to 13.7
Ocala, Florida.	30. to 31.5	6.3 to 6.6	5.6 to 5.9	15. to 15.2
Kissimmee, Florida.	20.7 to 25.5	4.4 to 5.	3.7 to 4.4	10.2 to 11.2

Specimens Examined.—137, 54 males, 48 females and 35 immature individuals.

GEORGIA: Groveland,[28] IX, 21, 1917, (Rehn and Hebard; very few in undergrowth of pine forest on Cannoche river plain), 1♂, 2♀. Chesser

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[28] This locality is probably well to the north of the northern line of fairly general distribution of the species. It was not seen by Fox at nearby localities or elsewhere in the region by Rehn and Hebard.

Island, Okefenokee Swamp, VII, 30 and VIII, 3, 1934, (J. D. and R. H. Beamer; McKinstry), 2♂, 2♀, 1 juv. ♂, [Univ. of Kansas and Hebard Clns.]. Bainbridge, IX, 5 and 6, 1915, (Rehn and Hebard; not abundant on oak shoots in sandy oak forest), 8♂, 13♀, *type, allotype, paratypes,* 6 large juv. ♀.

FLORIDA: Hilliard, VIII, 19, 1930, (R. H. and J. D. Beamer; Tuthill; Nottingham; McKinstry), 5♂, 3♀, [Univ. of Kansas and Hebard Clns.]. Pomona, IX, 7 and 8, 1917, (Rehn and Hebard; in areas of oak shoots in pine woods), 5♀, 2 small juv. ♂. Gainesville, VIII, 15 to 17, 1905, (Rehn and Hebard; in undergrowth of pine woods and Saw Palmetto scrub), 1♂, 2 medium juv. ♂, 2 medium juv. ♀. Ocala,[29] IX, 19 and 20, 1917, (Rehn and Hebard; moderately common in areas of oak shoots in sandy pine flatwoods), 13♂, 9♀, 1 large juv. ♂, 2 medium juv. ♀. Kissimee, IX, 9, 1917, (Rehn and Hebard; very few on sandy flats with wire grass and Saw Palmetto), 3♂, 2♀. Woodville, IX, 1, 1915, (Rehn and Hebard; in oak shoots in undergrowth of Long-Leaf Pine flatwoods), 3♂, 2♀, 2 large juv. ♂, 6 large to medium small juv. ♀. Carrabelle, IX, 2 and 3, 1915, (Rehn and Hebard; moderate numbers everywhere in scrub on sandy flats), 18♂, 10♀, 3 medium large to medium juv. ♂, 8 medium large to medium juv. ♀.

Aptenopedes aptera aptera Scudder (Pl. XV, fig. 1.)

1877. *Aptenopedes rufovittata* Scudder (♂, not [juv.] ♀ [30]), Proc. Boston Soc. Nat. Hist., xix, p. 85. [♂; Fort Reed, Florida.]

1877. *Aptenopedes aptera* Scudder, Proc. Boston Soc. Nat. Hist., xix, p. 86. [♀; Fort Reed, Florida.]

This insect in size and appearance shows an average close agreement with the large individuals of *aptera borealis* here described which are found in the region immediately to the north (from Ocala to Gainesville). It differs in the males having the lateral pronotal and medio-longitudinal abdominal bands unusually wide and usually orange (zinc orange in the most intensive specimens), but sometimes these bands are buffy, such individuals being very similar in general appearance to those of the other races of the species. The male penis, however, has the dorsal pair of parameres more enlarged, broader, particularly distad, and not at all wedge-shaped in dorsal aspect.

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[29] It should be noted that *aptera aptera* and *hubbelli* also occur at this locality. Females of *aptera borealis* and *aptera aptera* from Ocala appear to be virtually indistinguishable and immatures of these races and of *hubbelli* from there can not be separated at present with any degree of assurance.

[30] The immature female was selected as single type of *rufovittata* by Rehn and Hebard in 1916, thus placing *rufovittata* as a synonym of *sphenarioides*.

Females are virtually indistinguishable from large females of *aptera borealis*.

One of the topotypic males, originally recorded as *rufovittata*, has been loaned for examination through the kindness of the Museum of Comparative Zoology. It is slightly smaller than the average in our series, agrees closely in all features here considered diagnostic for the race, and is intensive in coloration, with pronotal and medio-longitudinal abdominal bands broad and zinc orange.

Specimens Examined.—70; 23 males, 37 females and 10 immature individuals.

FLORIDA: Ocala, IX, 19 and 20, 1917, (Rehn and Hebard; moderately common in areas of oak shoots in sandy pine flatwoods), 3♂, 3♀. Dunnellon, IX, 18 and 19, 1917, (Rehn and Hebard; moderately common in rolling deforested country with thick undergrowth of Saw Palmetto, Bayberry and oak shoots but very few grasses), 10♂, 18♀, 3 large to moderately large juv. ♀. Gotha, X, 1901, (H. Nehrling), 1♂ (recorded as *aptera*), [A.N.S.P.]. Fort Reed, IV, 10 to 21, (J. H. Comstock), *paratype* of *rufovittata*, [Mus. Comp. Zool.]. Trilby, IX, 16, 1917, (Rehn and Hebard; moderately numerous particularly in Saw Palmetto thickets and other dense undergrowth in open), 5♂, 3♀, 1 small juv. ♂, 1 large and 1 medium small juv. ♀. Lakeland, IX, 11, 1917, (Rehn and Hebard), 3♂, 3♀, 1 large juv. ♂, 3 medium juv. ♀.

Where both *aptera aptera* and *aptera borealis* occur, intergradation is to be expected. Females may be indistinguishable, but in the present race they more often show the dorsal surface of the caudal tibiae purplish or pink.

It is probable that *aptera aptera* is limited in distribution to a comparatively small portion of central peninsular Florida.

Aptenopedes aptera saturiba[81] new subspecies (Pl. XV, figs. 2 and 3.)

This race is described from a series secured in a sandy oak scrub area at DeLeon Springs, to the east of the St. Johns River, in the northeastern portion of central peninsular Florida. With it were found *Hesperotettix osceola* Hebard (also recorded from Ocala) and *Melanoplus adelogyrus* Hubbell (also known and originally reported from similar environment near Emporia and Enterprise Junction). Like the latter species it is probably very locally distributed and is supplanted in the surrounding more extensive areas of different ecology by related races or species.

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[81] Aboriginal inhabitants of the region in which this race occurs.

It is superficially quite similar to *aptera simplex* here described, but the dorsal lobes of the penis are definitely more chitinous, produced in a blunt decurved finger dorsad and a smaller and much shorter finger ventrad, with intervening lateral margin broadly concave. This is much like the type developed in *aptera coquinae* here described except that in that southeastern race the dorsal finger is much shorter and heavier. The dorsal pair of parameres rather suggest those of *aptera aptera* but are definitely narrower and more produced.

It is probable that this race will be found only locally, in central eastern Florida. Intergradation with *aptera coquina* may appear in material from along the northern portion of the Indian River.

Type.—♂; DeLeon Springs, Florida. September 9, 1917. (Rehn and Hebard). [Hebard Collection, Type No. 1294].

Generally similar in external structure to *aptera simplex* here described, differing as noted above. Size and form similar, averaging smaller and less robust than the other races. Penis with basal portion very large, dorsal lobes dark, more strongly chitinous than in the preceding races (but agreeing with *aptera coquinae*) of distinctive form as described above; dorsal pair of parameres rather suggesting those of *aptera aptera* but more produced, very much less produced than in *aptera coquinae,* in dorsal aspect otherwise similar to those of *aptera aptera* but not as much expanded.[32]

Allotype.—♀; same data as type. [Hebard Collection].

Indistinguishable from females of *aptera simplex.*

Coloration as described for *aptera simplex.* Lateral pronotal lines and medio-longitudinal dorsal band of abdomen of males usually whitish, sometimes faintly tinged with pinkish. Females with the abdominal band only, this narrower, not continued on the pronotum in either sex.

Specimens Examined.—16; 8 males and 8 females.

FLORIDA: DeLeon Springs, IX, 8 and 9, 1917, (Rehn and Hebard; not scarce in dwarf oaks throughout extensive sandy scrub area), 8♂, 8♀, *type, allotype, paratypes.*

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[32] Atypical material of *aptera coquina* more strongly indicates that *aptera saturiba* is definitely more closely related to it than to *aptera aptera.*

Aptenopedes aptera coquinae [88] new subspecies (Pl. XV, figs. 4 to 6.)

This handsome southeastern race is quite similar in general appearance to large examples of *aptera borealis* here described. The females show, however, pale lines margining the disk of the pronotum laterad, in this sex also present only in *hubbelli* here described of the other almost apterous species, but much more prominently developed in all of the races of *sphenarioides* Scudder.

The great size of the specimens found on Silver Palms suggests that this feature is more influenced by food plant or immediate environment than by geographic distribution. This factor probably explains the decided size difference from the normal shown by certain series of a number of the forms of *Aptenopedes*.

Type.—♂; Miami, Florida. March 3, 1916. (M. Hebard). [Hebard Collection, Type No. 1295].

Size medium, form moderately robust for the species (the normal for this race, which varies in different series from small to extremely large). Generally similar to *aptera saturiba* here described. Dorsal lobes of penis similarly dark and chitinous, shagreenous, with dorsal finger shorter than in that race, straight and rounded at apex and ventral finger very similar to it (individually varying from heavier to definitely smaller and less produced than the dorsal finger). Dorsal pair of parameres of same type but produced, curved to become horizontal, narrow and elongate but enlarged distad.

Allotype.—♀; same data as type. [Hebard Collection].

Differs from all the other races of *aptera* in having narrow pale marginal bands delimiting the pronotal disk from the lateral lobes (but similar to those found in females of *hubbelli*). Much larger and decidedly more robust than male.

General coloration very similar to *aptera simplex* as here described. The lateral pronotal and medio-longitudinal abdominal bands broad in the males, usually whitish, rarely weakly yellowish buff; in females less heavy, apparenty more often tinged with yellowish buff or brownish. Caudal tibiae glaucous to deep glacous, in females with dorsal surfaces often purplish.

The great size variation occurring over a comparatively small area is demonstrated by the following specimens.

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[88] In reference to the coquina rock underlying the pine woods (*Pinus caraibea*) which cover much the greater portion of the range of this race.

♂	Length of body	Length of pronotum	Caudal width of pronotum	Length of caudal femur
Miami. *Paratype*.	17.7	3.1	2.7	9.3
Miami. *Type*.	20.2	4.7	3.3	11.1
Miami. *Paratype*.	22.1	4.9	3.7	11.9
Florida City, on Silver Palm. ..	23.7	5.1	3.9	13.2
♀				
Miami. *Allotype*.	27.3	5.8	4.9	13.
Miami. *Paratype*.	31.8	6.3	5.8	15.5
Florida City, on Silver Palm. ..	48.	7.8	6.8	17.3
Royal Palm Key.	45.5	7.7	6.8	17.1

In the vicinity of Miami, however, a series taken at the same place and in the same environment almost always shows very little size variation.

Of the Florida Keys, only Big Pine Key has an extensive growth of pine flatwoods, *Pinus caribaea*, and unfortunately only immatures were secured there. The race represented is probably *aptera coquinae*, but adult males must be secured before this can be definitely stated.

Specimens Examined, (almost all of which have been previously recorded as *aptera*).—58; 26 males, 14 females and 18 immature individuals.

FLORIDA: Vero, VIII, 23, 1933, (E. R. Helwig), 3♂, [A.N.S.P. and Hebard Clns.]. Likely, VII, 24, 1934, (R. H. Beamer; Griffith), 4♂, 4♀, [Univ. of Kansas and Hebard Clns.]. Boca Raton, III, 1, 1916, (M. Hebard; very scarce on dwarf oaks in sand area with scrub pines), 1♂, 1♀. Deerfield, III, 1, 1916, (M. Hebard; same as at last locality), 2♂. Miami, I, 17, 1899, (S. N. Rhoads), 1♂, *paratype*, [A.N.S.P.]; II, 7, 1904, (M. Hebard; in wire grass in pine woods, *Pinus caribaea*, to north of town), 3♂, *paratypes*, 1 large juv. ♂; III, 3, 1916, (M. Hebard; in Saw Palmetto, Sofkee and wire grass of pine woods, *Pinus caribaea*), 7♂, 2♀, *type, allotype, paratypes;* Southside, III, 6 and 16, 1915, (M. Hebard; same), 3♀, *paratypes*, 2 small juv. ♂, 1 medium juv. ♀; Southside, III, 27, 1910, (M. Hebard; same), 2♂, 1♀, *paratypes*, 1 large juv. ♀. Cocoanut Grove, VIII, 9, 1930, (L. D. Tuthill), 1 very large juv. ♀, [Univ. of Kansas]. Florida City (Homestead), III, 13, 1920, (M. Hebard; on Silver Palms, *Coccothrinax argentea*, found very scarce while searching for *Belocephalus sleighti simplex*

Hebard,[34] in pine flatwoods, *Pinus caribaea*), 2 ♂, 2 ♀ ; III, 17 to 19, 1910, (M. Hebard; in undergrowth of pine flatwoods, *Pinus caribaea*), 1 teneral ♂ ; VII, 10 to 12, 1912, (Rehn and Hebard; same), 3 juv. ♂, 7 juv. ♀ (large to small). Detroit, VII, 12, 1912, (Rehn and Hebard; same), 2 medium juv. ♀.[35] Royal Palm Key, (F. M. Jones), 1 ♀, [A.N.S.P.]. ? Big Pine Key, VII, 6, 1912, (Rehn and Hebard; same), 1 small juv. ♂, 3 small juv. ♀.

Aptenopedes hubbelli[36] new species

(Pl. XV, figs. 7 and 8; pl. XVI, fig. 5.)

1914. *Aptenopedes aptera* Rehn and Hebard, (not of Scudder, 1877), Jour. New York. Ent. Soc., xxii, p. 109. [♂, ♀ ; Tampa, Punta Gorda and Marco, Florida.]

1916. *Aptenopedes aptera* Hebard, (not of Scudder, 1877), Ent. News, xxvii, p. 19. [♂, ♀ ; Pineland, Florida.]

This insect in external appearance strongly resembles *aptera aptera* Scudder. Its range includes the greater portion of western peninsular Florida except the northern section, and throughout this extensive area it apparently completely supplants *aptera* except that the ranges of the two evidently overlap in a narrow northeastern strip.

In spite of the great general similarity, however, both sexes may be easily distinguished from that race without dissection, the males by the usually narrow pronotal bands (which are usually, but not always, tinged with orange) and the scarcely enlarged apex of the abdomen combined with the much sharper and less extensive elevation of the pallium (caused by the very differently shaped penis), the females by the presence of pale lateral pronotal bands (also developed in *aptera coquinae* here described, alone of the races of that species).

The penis, though of wholly different type from that of any of the more closely allied species, shows close similarity to the type developed in *sphenarioides* Scudder, except for the greater development of the dorsal lobes and the lamellation of the dorsal pair of parameres.

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[34] At the time I thought an unknown race or species might be present, peculiar to the Silver Palm. Laboratory examination, however, immediately showed that nothing of the sort occurs in either case.

[35] Contrary to our original comments on these immatures, the present species shows microscopic rudimentary tegminal scales not only in adults but also in the later instars of immaturity in both sexes.

[36] Named in honor of T. H. Hubbell, whose masterly studies in the Orthoptera and constant coöperation have been of the utmost value to the author.

Type.— ♂; Fort Myers, Florida. September 13 to 15, 1917. (Rehn and Hebard). [Hebard Collection, Type No. 1296].

Size medium large and form robust for the genus. Head, pronotum, mesonotum, metanotum, pleura, microscopic tegminal scales, tympana, prosternal spine, furcula, supra-anal plate (except that the lateral margins are developed proximad in a usually prominent proximal node or tooth), cerci, paraprocts, pseudosternite and subgenital plate as here described for *aptera simplex*. Penis with a large base, dorsal lobes greatly reduced when compared with those of *aptera*, produced latero-cephalad (on each side of the erect, adjacent, sharp, slender projecting tips of the four parameres) as much smaller but similarly shagreenous, rounded (very often somewhat irregular) flaps; exposed distal portions of parameres distinctive, all adjacent, straight, attingent, erect and slender, the dorsal pair lamellate, in lateral aspect tapering evenly to their acute apices and projecting the same distance as the ventral pair, the latter aciculate.

Allotype.—♀; same data as type. [Hebard Collection].

As described for *aptera simplex* except for the distinctive lateral pale pronotal bands discussed above. Apparently indistinguishable from females of *aptera coquinae* except through distributional data.

The extremes of the series are included in the following measurementes.

♂	Length of body	Length of pronotum	Caudal wid of pronotal disk	Length of caudal fem
Ocala, Florida.	18.7 to 20.8	4. to 4.5	2.9 to 3.2	10.3 to 11.8
Lake Jovita, Florida.	14.6 to 16.2	3.5 to 3.8	2.1 to 2.7	8.8 to 9.
Fort Myers, Florida. *Paratypes*.	18.3 to 20.5	3.8 to 4.3	2.8 to 3.2	9.8 to 11.3
♀				
Yankeetown, Florida.	27.8 to 39.4	5.9 to 6.2	5. to 5.6	13.8 to 14.1
Lake Jovita, Florida.	23.	4.7	3.8	11.2
Fort Myers, Florida. *Paratypes*.	27.5 to 32.6	5.5 to 6.3	5. to 5.7	13.2 to 15.

Size in the present species is again clearly influenced largely by conditions of immediate environment and is little affected by geographic distribution.

Coloration and color pattern very similar to *aptera aptera*, the males with lateral marginal bands of pronotal disk usually light orange, rarely whitish, the females with these bands likewise present but narrower, varying from light yellow buff through light yellow orange (usual) to rich orange (rare). Caudal tibiae glaucous with dorsal surface purplish, this latter usually more strongly indicated in females and occasionally rich pink, caudal tarsi rich pink. Cephalic and median limbs of the general green coloration except in males of some series in which all or the majority have these members rich orange brown. Pinkish coloration of apex of male abdomen, so often shown in *aptera*, obsolete or weakly indicated.

That this is a distinct species and not a race of *aptera* is clearly shown by the penis, convergence and intergradation between the two types now being impossible. In *hubbelli* the form of the penis further shows no variation worthy of note in the large series at hand. Though *aptera* and *sphenarioides* are quite generally present over a great area of coincident distribution, *hubbelli* (apparently wholly) supplants the former over a region where its distribution is similarly coincident with that of *sphenarioides*. The other species of the genus are less extensively distributed and where found are local, limited to xeric sand scrub-oak areas.

Specimens Examined.—107; 62 males, 33 females and 12 immature individuals.

FLORIDA: Ocala, IX, 19 to 20, 1917, (Rehn and Hebard; with *aptera borealis* and *aptera aptera* in areas of oak shoots in sandy pine flatwoods), 11♂, 2♀. Yankeetown, VII, 17, 1934, (R. H. and J. D. Beamer; Griffith; McKinstry), 11♂, 6♀, 1 medium juv. ♀, [Univ. of Kansas and Hebard Cln.]. Trilby, IX, 16, 1917, (Rehn and Hebard; lowland pine woods, undergrowth of Saw Palmetto, Gallberry and *Kalmia*), 1♂, 6♀. Lake Jovita, VII, 20, 1934, (R. H. Beamer, Jr.), 3♂, 1♀, [Univ. of Kansas and Hebard Cln.]. Anona, IX, 17, 1917, (Rehn and Hebard; occasional in sandy scrub of low oaks), 3♀, 1 medium small juv. ♂, 1 medium small and 1 small juv. ♀. Arcadia, IX, 12, 1917, (Rehn and Hebard; in Long Leaf Pine woods undergrowth, a few in *Myrica cerifera*), 5♂, 2♀. Fort Myers, IX, 13 to 15, 1917, (Rehn and Hebard; throughout undergrowth of pine woods, particularly in Saw Palmetto clumps), 28♂, 11♀, *type, allotype, paratypes*, 4 large to medium juv. ♀. Iona, IX, 13, 1917, (Rehn and Hebard; same), 2♂, 1 large juv. ♂, 1 medium juv. ♀. Pineland on Pine Island in Charlotte Harbor, V, 18 and 20, 1915, (M. Hebard; only two adults seen, immatures numerous in undergrowth of Saw Palmetto and wire grass of *Pinus caribaea* flatwoods), 2♂. Marco, IV, 19, 1912, (W. T. Davis), 1♀, [Hebard Cln.]. Estero, VII, 21, 1934, (R. H. and J. D. Beamer; Griffith), 1♀, 2 medium juv. ♀, [Univ. of Kansas and Hebard Clns.].

Aptenopedes nigropicta new species (Pl. XV, figs. 9 and 10.)

This remarkable species is strikingly differentiated by its coloration, marking and development of the penis. It is a species of medium small size but is slightly more robust than any of the races of *aptera* Scudder, to which species nearest relationship is indicated. It is probably an insect of very discontinuous distribution, occurring in xeric sandy areas and may be limited to the central ridge of Florida northwest of Lake Okechobee.

Type.—♂; Childs, DeSoto County, Florida. August 6, 1930. (R. H. Beamer). [Hebard Collection, Type No. 1297].

Size medium small, form decidedly robust for the genus, in this latter chapter approaching *robusta* here described. Head much as in *aptera aptera* Scudder, but it and the eyes slightly less deep. Pronotum proportionately shorter, its sulci more pronounced, but this accentuation more from coloration than contour. Tegmina, furcula, cerci, supra-anal plate, paraprocts, and subgenital plate much as in *aptera aptera.* Penis distinctive though of the same general type as in that insect; dorsal lobes each developed into two bilobate shagreenous chitinous proximo-lateral processes much as in *aptera aptera,* dorsal pair of parameres produced in two large, adjacent, rounded-subquadrate lobes with a decided concavity caudad, the ventral pair of parameres situated ventro-proximad, adjacent, directed distad and curving dorsad to their acute apices.

Allotype.—♀; same data as type. [Hebard Collection].

Larger and more robust than male. More robust but otherwise very similar to the smaller of the females of *aptera aptera,* the general coloration in life being, however, probably quite different. Curved apices of dorsal valves of ovipositor relatively elongate.

General coloration of males (apparently somewhat discolored) light brownish buff. Pronotum with all transverse as well as latero-longitudinal short sulci more or less strikingly defined in blackish brown, this weakest dorso-mesad. Pleura and proximal abdominal tergites laterad suffused and with sulci also blackish brown. Sides of face in one male washed with olivaceous. Cephalic and median limbs and caudal femora yellowish olive, the latter yellowish buff internally and ventrad, the genicular arches blackish brown with other portions dull whitish. Caudal tibiae deep glaucous; base, spines and apices of spurs black. Caudal tarsi dull pink. Female (somewhat discolored) dull yellowish olive, immaculate. Caudal tibiae dull glaucous, purplish pink dorsad. Caudal tarsi pink.

Three males and one female, paratypes, bearing the same data as the described pair, show little size variation. Length of body ♂ 17.8, ♀ 24.; length of pronotum ♂ 3.8, ♀ 5.; caudal width of pronotal disk ♂ 3.2, ♀ 4.7; length of caudal femur ♂ 9.7, ♀ 12.2 mm.

Aptenopedes robusta new species

(Pl. XVI, figs. 6 and 7; pl. XVII, fig. 5.)

This insect may well be considered the most anomalous of the genus. The penis is of entirely different type from that of any other species. It is the most robust species of *Aptenopedes* but agrees with the slenderest and most widely separated species, *sphenarioides* Scudder, in having very small but extremely narrow tegmina which reach to (female) or across (male) the large tympanum. The rich pink tibiae in both sexes afford another striking character.

Undoubtedly another restricted type, the insect should be sought in xeric sand areas along the east coast of Florida in the Indian River region opposite Lake Okeechobee.

Type.—♂; Likely, Palm Beach County, Florida. July 24, 1934. (J. D. Beamer). [Hebard Collection, Type No. 1298].

Size moderately large and form very robust for the genus, the general form showing greatest similarity to that of *nigropicta* here described. Head in dorsal aspect similarly very blunt, but eyes much deeper and general contour of head and pronotum otherwise more as in *aptera coquinae* here described. Pronotum with definition between dorsum and lateral lobes very feeble though suggested, sulci not conspicuous. Tegmina represented by very narrow pads which expand feebly to their rounded apices, the latter slightly surpassing the large tympana but the latter wider than their vertical width. Furcula represented by two moderately stout, irregular, very faintly divergent fingers, deeply inset due to the sudden and decided emargination mesad of the tergite from which they spring, each twice as long as broad beyond its basal weakly thickened portion. Supra-anal plate rather narrowly shield-shaped, proximad medio-longitudinally concave and weakly so laterad, a very small blunt tooth on each lateral margin opposite cercal bases. Cerci narrowing strongly proximad, with remaining portion very slender to the acute apex, directed dorso-caudad and failing to reach as far caudad as the apex of the supra-anal plate. Paraprocts simple. Penis remarkably distinctive; dorsal lobes produced, adjacent along their inner margins, erect, curving caudad narrowly at apices where the distal margin is broadly concave on each side, widened also distad so that a sort of partial hood is formed; dorsal pair of parameres broad but not as broad as the dorsal lobes, similarly produced dorsad and distad curving caudad to project caudad narrowly beyond them with distal margin convex on each side (thus this margin of each dorsal lobe is concave and of each dorsal paramere convex), so that with the dorsal lobes they form a hood above the broad, attingent, erect ventral pair of parameres, the latter adjacent, their lateral margins curving obliquely to the adjacent acute-angulate meso-distal apices, their caudal faces moderately concave.

Allotype. — ♀; same data as type, but taken by M. R. Griffith. [Hebard Collection].

Decidedly larger and more robust than male, but proportionate difference between the sexes slightly less than in the other species excepting *nigropicta*. Form and coloration definitely different from that of this sex of any other known species of the genus. Tegmina similar to those of male but slightly less well developed, slightly narrower in proportions and reaching only to median point on tympana. Curved apices of dorsal valves of ovipositor relatively short.

Male generally olivaceous, a moderately broad post-ocular band of whitish margins the pronotal disk laterad and is continued to include the dorsal portion of the tegmina, a brownish suffusion narrowly margining this on lateral lobes and ventral portions of tegmina of that color. Furcula and medio-longitudinal portion of supra-anal plate light pink, this more weakly suggested medio-longitudinally dorsad on abdomen and in genicular areas of caudal femora, the bases of the genicular areas marked with a small black area on each side. Caudal tibiae pink, blackish very briefly proximad and suffused and darkened (individually to different degrees) internally for some distance distad, spines and apices of spurs black. Caudal tarsi pink.

Female rich green except for dorsal portions of tegmina which are paler, similar inconspicuous blackish markings on caudal limbs except the pink caudal tibiae lack the disto-internal suffusion.

The extremes in measurements are as follows: length of body ♂ 19.5 to 20.1, ♀ 27.7 to 28.8; length of pronotum ♂ 4.7 to 4.8, ♀ 6.2 to 6.3; caudal width of pronotal disk ♂ 3.7 to 3.7, ♀ 5.9 to 6.; length of tegmen ♂ 4.2 to 4.2, ♀ 4.8 to 4.9; length of caudal femur ♂ 10.7 to 10.9, ♀ 13. to 13.6 mm.

Two male and three female paratypes bear the same data as the described pair except that one female was secured by J. D. Beamer.

Aptenopedes sphenarioides and its races

The present species, more slenderly cylindrical than any of the others belonging to the genus *Aptenopedes* and possessing narrow pad-like tegmina, developed elsewhere only in *robusta* here described, is found to be definitely even more complex in its geographic differentiation than is *aptera* Scudder.

Whereas *aptera* divides naturally into five geographic races,[37] showing as a rule decided uniformity in these races where they occur, *sphenarioides* has apparently reached a less advanced stage in its development. Subject to even greater geographic differentiation, the recognition of not more than three races appears to be advisable; a northern, a central peninsular and a southern peninsular. Each of these is subject to decided differentiation, in more than one case fixed over a portion of its range. Thus the northern race can be separated readily into a western and an eastern type, while a change from the eastern again occurs to the south. Difference in a single feature in some cases and sometimes marked instability leads me to believe that only the three races mentioned above should be recognized and that the other conditions should be treated as atypic of these, indicating in some cases formative geographic races which are as yet insufficiently differentiated to warrant nominal recognition.

Nowhere in the Orthoptera have I encountered a species so clearly divided into geographic races showing in themselves from strong to weak evidence of further racial evolution.

In *sphenarioides* a much more complicated subgenital plate is developed than in any other species of *Aptenopedes*. In it the subgenital plate forms only a comparatively narrow distal rim of the very large proximal portion of the eighth sternite; this shows upon external examination to have a nearly vertical sulcus close to the proximal margin which converges to meet that margin dorsad. When the subgenital plate is deflexed this sulcus as well as the proximal margin are found to expand dorsad and have there an intricately attached area of soft tissue which is produced in a very large fleshy flap. When in normal position this flap covers the side and caudal portions of the bulbous base of the penis, but becomes erect and then assumes a latero-external position when the penis is extruded. In addition the internal margin of the subgenital plate bears a broad median triangular integument which protects the base of the penis from the rear but springs into an erect position when that organ is extruded.

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[37] With indices that in certain areas other races may be present but should not be described without more adequate evidence, obtainable only from more and larger series than are now available.

Aptenopedes sphenarioides appalachee new subspecies
(Pl. XVI, figs. 8 to 11.)

1904. *Aptenopedes sphenarioides* Morse, Carnegie Inst. Washington, Publ. No. 18, p. 55. [Juvs.; Waycross, Georgia; Live Oak (?), Tallahassee, Carrabelle and DeFuniak Springs, Florida.]

1905. *Aptenopedes sphenarioides* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1904, p. 793. [256 specimens, ♂, ♀: Thomasville, Georgia; Leon County, Florida.[88]]

1907. *Aptenopedes sphenarioides* Rehn and Hebard (the present race in part), Proc. Acad. Nat. Sci. Phila., 1907, p. 299. [Atypic "B": 29♂, 11♀, 24 immatures; Pablo Beach, Florida.]

1916. *Aptenopedes sphenarioides sphenarioides* Rehn and Hebard (the present race in part), Proc. Acad. Nat. Sci. Phila., 1916, p. 252. [Atypic "A"; Jesup and Brunswick, Georgia. Atypic "B": St. Simons Island and Cumberland Island, Georgia; Atlantic Beach, Pablo Beach and Daytona, Florida. Atypic "AB"; Jacksonville, Florida. Typical: Suwanee Creek (= Hopkins), Billys Island and Jordans in Okefenokee Swamp, Homerville, Albany and Bainbridge, Georgia; (?) Live Oak, Florida.]

1920. *Aptenopedes sphenarioides* Blatchley (the present race in part), Orth. of Northeastern America, p. 345. [Atypic "B"; Ormond, Florida.]

From *sphenarioides sphenarioides* Scudder typical material of this race is distinguished by characters of the male cerci, paraprocts and pseudosternite. Its distribution extends across southern Georgia to extreme southwestern Georgia, into extreme southeastern Alabama, in adjacent eastern Florida and as far west as DeFuniak Springs.

Four divisions are present in *sphenarioides apalachee* which are here considered "typical", "atypic A", "atypic B" and "atypic C".

Type.—♂; Thomasville, Florida. November 30, 1903. (M. Hebard). [Hebard Collection, Type No. 1299].

Very similar to *sphenarioides sphenarioides* in all except male genitalic characters. Size medium, form slender for the genus. Face strongly retreating. Pronotum elongate with percurrent medio-longitudinal carina. Tegmina very small, slender, elongate pads with apices rounded, extending across the large tympanum. Furcula represented by stout parallel fingers, longer than broad beyond the thickened areas from which they spring. Supra-anal plate narrowly linguliform, proximad broadly sulcate medio-longitudinally, laterad concave. Cerci short, stout, simple, truncate distad with dorso-distal angle broadly rounded and ventro-distal angle nearly as much so. Paraprocts large, each armed beneath the cercus with a stout elongate tubercle. Penis with proximal portion briefly tubular produced, from which project the four minute, straight, adjacent, elongate, erect parameres of which the first pair are very delicate with truncate apices, the second pair shorter, narrower and with convex apices.[39] Pseudosternite armed mesad on each side with a slender thorn-like curved spine, its apex acute, its base simple.

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[88] Color phases, habitat and habits discussed.

Allotype.—♀; same data as type but taken December 26, 1903. [Hebard Collection].

Decidedly larger and more robust than male and more cylindrical. Fastigium somewhat more produced than in the other species of the genus, from females of which it may be distinguished by the presence of very small but readily visible tegmina, except those of *robusta* in which species similar tegmina are developed.

♂	Length of body	Length of pronotum	Caudal width of pronotal disk	Length of tegmen	Length of caudal femur
Thomasville, Ga. (41)	16. to 18.2	3.3 to 3.8	2.2 to 2.4	3.2 to 3.8	8.7 to 9.2
Tallahassee, Fla.	19.8	4.2	2.8	4.4	10.2
♀					
Thomasville, Ga. (38)	22. to 25.5	4.2 to 5.	3.8 to 4.2	3.2 to 4.4	10.8 to 12.2
Tallahassee, Fla.	28.6	5.7	4.9	4.8	13.9

The green and brown color phases were discussed fully by Rehn and Hebard in 1904. The post-ocular pale line is very straight, defining the pronotal disk from the lateral lobes and including the dorsal half of the tegmina; it is buffy or faintly pinkish and is margined below with a narrow brown line (naturally least conspicuous in dark brown individuals). A striking feature is the pale (in dark specimens) or blackish (in pale specimens) dot caudad on each side of the abdominal tergites; in the males longitudinal but slightly oblique dark streaks are often present crossing the tergite to these dots, the intervening median area often suffused, while in pale females the dots may have a minute whitish area on each side. The most beautiful of the color phases is one in which the entire dorsal area is rich purplish pink, this being most striking in otherwise green females. The caudal tibiae are light glaucous, often with a pale greenish tinge, or light pink, sometimes the latter proximad and the former distad.

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[39] The penis is similar in all the races of *sphenarioides*. That of *hubbelli* is much nearer this type than any other species of the genus.

Typical Specimens Examined, in addition to 44 ♂, 45 ♀ and 12 immatures previously recorded, of which the 41 ♂ and 38 ♀ now at hand are designated paratypes.—95; 24 males, 13 females and 58 immature individuals.

GEORGIA: Bainbridge, IX, 5, 1915, (Rehn and Hebard; in undergrowth of Long-Leaf Pine woods near "branch"), 5 ♂, 2 ♀, 5 medium juv. ♂, 10 medium juv. ♀.

ALABAMA: Dothan, IX, 6, 1915, (Rehn and Hebard; adults rare, immatures in moderate numbers in undergrowth of Long-Leaf Pine woods), 2 ♂, 1 large juv. ♂, 2 medium juv. ♂, 1 large juv. ♀, 7 medium juv. ♀.

FLORIDA: Tallahassee, IX, 2, 1915, (Rehn and Hebard; moderately abundant in luxuriant weeds in fields and woodland near pond, few in waste field), 4 ♂, 6 ♀, 6 juv. ♀, from small to medium large. Woodville, IX, 1, 1915, (Rehn and Hebard; few in pine woods undergrowth, common in richer vegetation about a sink-hole), 6 ♂, 2 ♀, 2 medium juv. ♂, 2 medium juv. ♀. Quincy, X, 27, 1905, (W. A. Hooker), 1 ♀, [U.S.N.M.]. Sopchoppy, IX, 4, 1915, (M. Hebard; undergrowth in Long-Leaf Pine forest), 1 ♂. Carrabelle, IX, 2 and 3, 1915, (Rehn and Hebard; few in moisture loving grasses and plants on the edge of swampy areas), 3 ♂, 10 ♀, 3 juv. ♂, 2 juv. ♀, from small to very large. River Junction, VIII, 31, 1915, (Rehn and Hebard; moderately abundant in lush vegetation in stream bottom), 3 ♂, 2 ♀, 2 medium juv. ♂, 11 medium to small juv. ♀. De Funiak Springs, VIII, 30, 1915, (M. Hebard; very scarce in gallberry bushes and also in moisture loving plants in Long-Leaf Pine woods), 4 medium to small juv. ♀.

Atypic "A". (Pl. XVI, figs. 9 and 10.) This condition differs from the typical only in having the disto-ventral angle of the male cerci to different degrees more angulate and produced, thus showing the first step in the transition toward *sphenarioides sphenarioides.* It occurs in eastern Georgia north of the range of typical *sphenarioides apalachee* as far as Pembroke, Groveland, Collins, Vidalia and Dublin, and westward also as far as McRae.

Atypic "A" *Specimens Examined,* in addition to 10 ♂, 6 ♀ and 2 juvs. previously recorded. — 145; 79 males, 42 females and 24 immature individuals.

Georgia: Pembroke, IX, 23, 1913, (H. Fox), 2♂, 1 small juv. ♀. Groveland, IX, 21, 1917, (Rehn and Hebard; in gallberry bushes bordering swampy area), 15♂, 5♀, 2 medium juv. ♂, 5 medium juv. ♀. Cannoche River near Groveland, IX, 21, 1917, (Rehn and Hebard; in heavy undergrowth of gallberry and other bushes in river plain pine forest), 1♀. Claxton, IX, 22, 1923, (H. Fox), 2♂, 2♀, 1 small juv. ♂. Collins, IX, 21, 1923, (H. Fox), 14♂, 9♀, 1 medium juv. ♂, 2 medium juv. ♀. Vidalia, IX, 20 to 23, 1923, (H. Fox), 2♂. Hazelhurst, IX, 29, 1923, (H. Fox), 20♂, 7♀, 4 small juv. ♂. Dublin, IX, 20, 1923, (H. Fox), 2♂. McRae, IX, 30, 1923, (H. Fox), 7♂, 5♀. Cox, III, 29, 1923, (H. Fox), 1 medium juv. ♀. Folkston, VIII, 2, 1934, (J. D. and R. H. Beamer, Jr.), 5♀, [Univ. of Kansas and Hebard Clns.]. Chesser Island, Okefenokee Swamp, VII, 30 and VIII, 3, 1934, (Beamer and McKinstry), 2♂, 1♀, [Univ. of Kansas and Hebard Cln.].

Florida: Hilliard, VII, 28, 1934 and VIII, 19 and 31, 1930, (Beamer; Nottingham; Oman; Lee), 11♂, 7♀, 7 juv. ♀, [Univ. of Kansas and Hebard Cns.].

Atypic " A " *toward* " B," in addition to 8♂ and 8♀ previously recorded from Jacksonville; moreover the female originally recorded from the locality by Scudder is probably the same.

Florida: Magnolia Springs, V, 22, 1916, (M. Hebard; in boggy undergrowth of pine woods), 1♂.

Atypic "B". This condition differs further from typical *sphenarioides apalachee* in the males having shorter furcula, a more falcate apex of the cercus with ventro-caudal angle more acute and the paraprocts not tuberculate.

This is a strictly coastal condition of which 43 males, 18 females and 13 immatures have been recorded from Cumberland Island, Georgia; Atlantic Beach, Pablo Beach, Ormond and Daytona, Florida.

Atypic "C". (Pl. XVI, fig. 11.) This condition is much like atypic "B", but the thorn-like process on each side of the pseudosternite is shorter, more curved and blunter.

Atypic " C " *Specimens Examined,* in addition to 3♂ previously recorded from Gainesville.— 39; 17 males, 21 females and 1 immature individual.

Florida: Pomona, IX, 7 and 8, 1917, (Rehn and Hebard; common in marsh grasses, occasional in pine woods undergrowth), 11♂, 15♀, 1 large juv. ♀. Waldo, VIII, 18, 1930, (Beamer and Nottingham), 6♂, 8♀, [Univ. of Kansas].

Aptenopedes sphenarioides sphenarioides Scudder

(Pl. XVI, figs. 12 to 14.)

1877. *Aptenopedes sphenarioides* Scudder, Proc. Boston Soc. Nat. Hist., xix, p. 84. [♂,[40] ♀; Fort Reed, Florida.]

1877. *Aptenopedes rufovittata* Scudder (in part), Proc. Boston Soc. Nat. Hist., xix, p. 85. [Juv. ♀;[41] Fort Reed, Florida.]

Important features for this race are as follows. Average size small for the species, close to that of our Thomasville, Georgia series of *sphenarioides apalachee* here described. Male. Furcula heavy, almost parallel and even more elongate than in typical *sphenarioides apalachee*, being over twice as long as broad. Supra-anal plate narrow, with a decided proximo-lateral tooth. Paraprocts simple, unarmed. Cerci with apical portion not elongate but definitely falcate. Pseudosternite with a lamellate rounded process, the dorso-external portion of which is slightly produced dorsad and curved inward to its sharply rounded apex.

Specimens Examined.—26; 16 males, 9 females and 1 immature individual.

Florida: Gotha, X, 1901, (H. Nehrling), 1♂, 2♀, [A.N.S.P.] Kissimmee, IX, 9 and 10, 1917, (Rehn and Hebard; very few in undergrowth of cypress bays, moderate numbers about their edges on wet prairie), 15♂, 7♀, 1 large juv. ♀.

Atypic "D". Compared with *sphenarioides sphenarioides* this condition differs as follows. Size large to very large. Male. Furcula decidedly smaller, divergent. Supra-anal plate broad. Cerci and paraprocts similar, the latter, however, showing a slight rounded elevation beneath the cerci. Pseudosternite showing a large irregularly knobbed process, evidently a development from the typical for this race but much more thickened and irregular.

Atypic "D" *Specimens Examined.*—139; 79 males, 56 females and 4 immature individuals.

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[40] The male from Fort Reed, Florida, figured by Scudder in 1897 (Proc. U. S. Nat. Mus., xx, pl. 26, fig. 10) and at the Museum of Comparative Zoology, is here selected single type. The female from Jacksonville, Florida, then recorded, is probably representative of *sphenarioides apalachee*, atypic "A" toward "B", here discussed under that race.

[41] This specimen was selected as type by Rehn and Hebard in 1916, *rufovittata* consequently falling as a synonym. The males described as *rufovittata,* however, are representative of *aptera aptera* Scudder.

FLORIDA: Ocala, VIII, 17, 1930, (R. H. Beamer), 1♀, [Univ. of Kansas]; IX, 19 and 20, 1917, (Rehn and Hebard; moderately common in undergrowth, but especially so about fennel and grassy spots), 21♂, 15♀, 1 medium juv. ♂. Dunnellon, IX, 19, 1917, (Rehn and Hebard; locally moderately numerous on sand flats with Saw Palmetto, Bayberry and scanty grasses), 4♂, 7♀. Trilby, IX, 16, 1917, (Rehn and Hebard; common in gallberry bushes in undergrowth of cypress bays and other undergrowth of Long Leaf Pine forest), 11♂, 16♀. Anona, IX, 17, 1917, (Rehn and Hebard), 1♂. Indian Beach on Sand Key, IX, 17, 1917, (Rehn and Hebard; moderate numbers in tall weeds and grasses on inner marshy edge of Key, few in beach vegetation), 9♂, 5♀, 1 medium juv. ♂. Tampa (recorded as *clara* by Rehn and Hebard in 1905), 4♂, 2♀ (small but otherwise similar). St. Petersburg, VIII, 18 to 26, 1931, (Bradley and Knorr), 1♂. Mulberry, VIII, 27, 1931, (Bradley and Knorr), 1♂, (slight cercal divergence toward *sphenarioides clara*). Arcadia, IX, 12, 1917, (Rehn and Hebard; few in *Heliotropium polyphyllum* on sand bars of Peace River, occasional in Long Leaf Pine woods undergrowth), 8♂, 6♀, 1 large juv. ♂, 1 medium juv. ♀, (with stronger cercal divergence toward *sphenarioides clara*). Vero, VIII, 23, 1933, (E. R. Helwig), 9♂, 2♀, (same), [A.N.S.P. and Hebard Cln.]. Kelsey City, VIII, 23, 1933, (E. R. Helwig), 10♂, 2♀, (same), [A.N.S.P. and Hebard Cln.].

Atypic "E". (Pl. XVI, fig. 14.) Size below to above median. Male. Pseudosternite with mesal projection on each side having a blunt curved outer spine (much like the blunt spine developed in atypic "C" of *sphenarioides apalachee* but an inner rounded projection indicating closer resemblance to *sphenarioides sphenarioides*. In other respects much like the latter, but furcula scarcely longer than broad and supra-anal plate broader, more as in atypical "D".

Atypic " E " Specimens Examined.—51; 29 males and 22 females.

FLORIDA: Lakeland, (G. O. Ainslie), 1♂, 1♀, [U.S.N.M.]; IX, 11, 1917, (Rehn and Hebard), 22♂, 17♀, (and 6♂, 4♀ previously recorded as *clara* by Rehn and Hebard).

Aptenopedes sphenarioides clara Rehn

(Pl. XVI, figs. 15 and 16; pl. XVII, fig. 4.)

1902. *Aptenopedes clara* Rehn, Ent. News, xiii, p. 14. [♂; Miami, Florida.]

1917. *Aptenopedes sphenarioides clara* Hebard, Ent. News, xxvi, p. 407. (Great size variation, due to local environmental conditions, noted and measurements given for three series.)

Rehn and Hebard recorded this insect as *clara* until 1915, when the author placed it as a race of *sphenarioides*.

Specimens Examined.—204; 102 males, 77 females and 25 immature individuals.

Of these 70♂, 52♀ and 20 immatures, previously recorded, are at hand from Miami Beach, Virginia Key, Cape Florida, Miami, Homestead (Florida City), Detroit, Long Key, Boot Key, Key Vaca, Big Pine Key, Key West, Pineland on Pine Island and Useppa Island, Florida.

FLORIDA: Royal Palm Key, III, 3, 1917, (M. Hebard; in undergrowth of tropical hammock land in Everglades), 1♂, 1 medium juv. ♂. Key Largo, VIII, 9, 1930, (R. H. Beamer), 4♂, 1♀, [Univ. of Kansas]; VIII, 21, 1931, (Bradley and Knorr), 1 large juv. ♀. Lower Matecumbe Key, IX, 4, 1931, (Bradley and Knorr), 2♀. Thirty miles west of east border of Everglades on Tamiami Trail, VIII, 30, 1931, (Bradley and Knorr), 1♀. Fort Myers, VIII, 11, 1930, (R. H. Beamer), 2♂, [Univ. of Kansas]; IX, 13 to 15, 1917, (Rehn and Hebard; generally distributed in wire-grass, Saw Palmetto, Bayberry undergrowth of *Pinus caribaea* forest on edge of cypress swamps), 23♂, 20♀, 2 medium juv. ♂, 1 medium juv. ♀. Iona, IX, 13, 1917, (J. A. G. Rehn; in undergrowth of pine woods), 1♂, 1♀. Useppa Island in Charlotte Harbor, V, 19, 1919, (M. Hebard), 1♂.

The extremes in size are found in material from the immediate vicinity of Biscayne Bay. These are: length of body ♂ 20.3 to 27.4, ♀ 26. to 34.9 mm.

EXPLANATION OF PLATES

PLATE XII

(Figures of male genitalia)

Fig. 1.—*Melanoplus marshalli marshalli* (Thomas). Marshall Pass, Colorado.[42] Dorsal view of furcula and supra-anal plate. (Much enlarged.)

Fig. 2.—*Melanoplus marshalli marshalli* (Thomas). Marshall Pass, Colorado. Lateral view of apices of dorsal lobes of penis. (Greatly enlarged.)

Fig. 3.—*Melanoplus marshalli marshalli* (Thomas). Gothic, Colorado. Caudal view of penis. (Much enlarged.)

Fig. 4.—*Melanoplus marshalli ascensor* (Scudder). Lake Martha, Wasatch Mountains, Utah. Dorsal view of furcula and supra-anal plate. (Same scale as Fig. 1.)

Fig. 5.—*Melanoplus marshalli ascensor* (Scudder). Lake Martha, Wasatch Mountains, Utah. Lateral view of apices of dorsal lobes of penis. (Greatly enlarged.)

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[42] This specimen is figured as it came probably from near the type locality. The majority of our specimens of the race, however, have the furcula longer to different degrees and the supra-anal plate variously narrower. In none however are the furcula as long or the supra-anal plate as narrow as in *marshalli ascensor*, shown in figure 4.

Fig. 6.—*Melanoplus oregonensis missoulae* new subspecies. *Paratype.* Missoula, Montana. Lateral view of cercus. (Much enlarged.)

Fig. 7.—*Melanoplus indigens indigens* Scudder. Upper Morgan Creek, Salmon River Range, Idaho. Lateral view of cercus. (Same scale as Fig. 6.)

Fig. 8.—*Melanoplus indigens indigens* Scudder, atypic. Evergreen, Idaho. Lateral view of cercus. (Same scale as Fig. 6.)

Fig. 9.—*Melanoplus indigens digitifer* new subspecies. *Type.* Haines, Oregon. Lateral view of cercus. (Same scale as Fig. 6.)

Fig. 10.—*Melanoplus payettei* new species. *Paratype.* McCall, Big Payette Lake, Idaho. Caudal view of penis. (Much enlarged.)

PLATE XIII

Fig. 1.—*Melanoplus oregonensis missoulae* new subspecies. *Paratype.* Missoula, Montana. Lateral view of distal portion of penis. (Much enlarged.)

Fig. 2.—*Melanoplus oregonensis missoulae* new subspecies. *Paratype.* Missoula, Montana. Caudal view of penis. (Same scale as Fig. 1.)

Fig. 3.—*Melanoplus indigens indigens* Scudder. *Type.* Salmon City, Idaho. Lateral view of penis. (Same scale as Fig. 1.)

Fig. 4.—*Melanoplus indigens digitifer* new subspecies. *Type.* Haines, Oregon. Lateral view of penis. (Same scale as Fig. 1.)

Fig. 5.—*Melanoplus indigens digitifer* new subspecies. *Type.* Haines, Oregon. Caudal view of penis. (Same scale as Fig. 1.)

Fig. 6.—*Melanoplus payettei* new species. *Paratype.* McCall, Big Payette Lake, Idaho. Lateral view of cercus. (Same scale as Pl. XII, Fig. 6.)

Fig. 7.—*Dendrotettix hesperus* new species. *Type.* Alder Springs, Cascade Mountains, Oregon. Dorsal outline of ovipositor valves. (Much enlarged.)

Fig. 8.—*Dendrotettix hesperus* new species. *Type.* Alder Springs, Cascade Mountains, Oregon. Lateral outline of ovipositor valves. (Same scale as Fig. 7.)

Fig. 9.—*Dendrotettix hesperus* new species. *Type.* Alder Springs, Cascade Mountains, Oregon. Ventral outline of subgenital plate and bases of ovipositor valves. (Same scale as Fig. 7.)

PLATE XIV

(Greatly enlarged figures of male penis. All on same scale)

Fig. 1.—*Aptenopedes aptera simplex* new subspecies. *Paratype.* Pablo Beach, Florida. Caudal view.

Fig. 2.—*Aptenopedes aptera simplex* new subspecies. Atypic in having dorsal pair of parameres very broad. San Pablo, Florida. Caudal

Fig. 3.—*Aptenopedes aptera simplex* new subspecies. Atypic in having dorsal pair of parameres very broad. San Pablo, Florida. Dorsal view.

Fig. 4.—*Aptenopedes aptera borealis* new subspecies. *Paratype.* Bainbridge, Georgia. Dorsal view.

Fig. 5.—*Aptenopedes aptera borealis* new subspecies. *Paratype.* Bainbridge, Georgia. Ventro-caudal view.

Fig. 6.—*Aptenopedes aptera borealis* new subspecies. Atypic depauperate condition. Kissimmee, Florida. Dorsal view.

Fig. 7.—*Aptenopedes aptera borealis* new subspecies. Atypic depauperate condition. Kissimmee, Florida. Ventro-caudal view.

Fig. 8.—*Aptenopedes aptera borealis* new subspecies. Showing narrowed dorsal pair of parameres, possibly due to crushing.[43] Cedar Key, Florida. Dorsal view.

Fig. 9.—*Aptenopedes aptera borealis* new subspecies. Showing narrowed dorsal pair of parameres, possibly due to crushing. Cedar Key, Florida. Ventro-caudal view.

PLATE XV

(Greatly enlarged figures of male penis. All on same scale)

Fig. 1.—*Aptenopedes aptera aptera* Scudder. Gotha, Florida. Dorsal view.

Fig. 2.—*Aptenopedes aptera saturiba* new subspecies. *Paratype.* DeLeon Springs, Florida. Dorsal view.

Fig. 3.—*Aptenopedes aptera saturiba* new subspecies. *Paratype.* DeLeon Springs, Florida. Caudal view.

Fig. 4.—*Aptenopedes aptera coquinae* new subspecies. *Paratype.* Miami, Florida. Dorsal view.

Fig. 5.—*Aptenopedes aptera coquinae* new subspecies. *Paratype.* Miami, Florida. Caudal view.

Fig. 6.—*Aptenopedes aptera coquinae* new subspecies. Atypic. Vero, Florida. Dorsal view.

Fig. 7.—*Aptenopedes hubbelli* new species. Yankeetown, Florida. Lateral view.

Fig. 8.—*Aptenopedes hubbelli* new species. Yankeetown, Florida. Dorsal view.

Fig. 9.—*Aptenopedes nigropicta* new species. *Type.* Childs, Florida. Dorsal view.

Fig. 10.—*Aptenopedes nigropicta* new species. *Type.* Childs, Florida. Lateral view.

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[43] The dorsal pair of parameres being inflated very feebly chitinized lobes dorsad, care must be taken not to mistake distortion for an atypic condition. In rare cases before me such distortion might have been mistaken for even a feature of racial significance had this not been realized.

PLATE XVI

Fig. 1.—*Asemoplus montanus* (Bruner). *Paratype.* From near Helena, Montana. Lateral outline of male cercus. (Much enlarged.)

Fig. 2.—*Asemoplus montanus* (Bruner). *Paratype.* From near Helena, Montana. Caudal view of penis. (Greatly enlarged.)

Fig. 3.—*Asemoplus sierranus* new species. *Paratype.* Harkness Peak, California. Dorsal view of furcula and supra-anal plate. (Much enlarged.)

Fig. 4.—*Asemoplus sierranus* new species. *Type.* Harkness Peak, California. Lateral outline of male cercus. (Same scale as Fig. 1.)

Fig. 5.—*Asemoplus sierranus* new species. *Type.* Harkness Peak, California. Caudal view of penis. (Same scale as Fig. 2.)

Fig. 6.—*Aptenopedes robusta* new species. *Paratype.* Likely, Florida. Dorsal view of penis. (Same scale as Plate XIV, figure 3.)

Fig. 7.—*Aptenopedes robusta* new species. *Paratype.* Likely, Florida. Caudal view of penis. (Same scale as Fig. 6.)

Fig. 8.—*Aptenopedes sphenarioides apalachee* new subspecies. *Paratype.* Thomasville, Georgia. Lateral view of male cercus. (Much enlarged.)

Fig. 9.—*Aptenopedes sphenarioides apalachee* new subspecies, atypic " A ". Hilliard, Florida. Lateral view of male cercus, showing deviation toward *sphenarioides sphenarioides.* (Same scale as Fig. 8.)

Fig. 10.—*Aptenopedes sphenarioides apalachee* new subspecies, atypic " A ". Hillard, Florida. Latero-median spine of pseudosternite (as developed in the typical, atypic " A " and atypic " B " conditions of the present race). (Greatly enlarged.)

Fig. 11.—*Aptenopedes sphenarioides apalachee* new subspecies, atypic " C ". Pomona, Florida. Production of pseudosternite, showing first deviation from the normal in this race (Fig. 10) in this feature. (Same scale as Fig. 10.)

Fig. 12.—*Aptenopedes sphenarioides sphenarioides* Scudder. *Paratype.* Fort Reed, Florida. Lateral view of male cercus. (Same scale as Fig. 8.)

Fig. 13.—*Aptenopedes sphenarioides sphenarioides* Scudder. *Paratype.* Fort Reed, Florida. Production of pseudosternite. (Same scale as Fig. 10.)

Fig. 14.—*Aptenopedes sphenarioides sphenarioides* Scudder atypic " E ". Lakeland, Florida. Production of pseudosternite, showing nearest approach to *sphenarioides apalachee* atypic " C ". (Same scale as Fig. 10.)

Fig. 15.—*Aptenopedes sphenarioides clara* Rehn. *Topotype.* Miami, Florida. Lateral view of male cercus. (Same scale as Fig. 8.)

Fig. 16.—*Aptenopedes sphenarioides clara* Rehn. *Topotype.* Miami, Florida. Production of pseudosternite, showing intricate and irregular lobation characteristic of this race. (Same scale as Fig. 10.)

Plate XVII

Fig. 1.—*Melanoplus foedus iselyi* new subspecies. *Type.* Male. Weatherford, Texas. (X 1 1/4)

Fig. 2.—*Melanoplus foedus iselyi* new subspecies. *Allotype.* Female. Weatherford, Texas. (X 1 1/4)

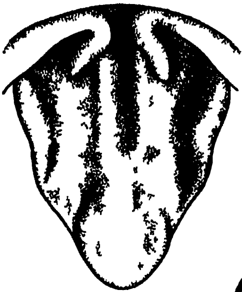
Fig. 3.—*Dendrotettix hesperus* new species. *Type.* Female. Alder Springs, Cascade Mountains, Oregon. (X 1 1/4)

Fig. 4.—*Aptenopedes sphenarioides clara* Rehn. Female. Miami Beach, Florida. (X 1 1/4)

Fig. 5.—*Aptenopedes robusta* new species. *Allotype.* Female. Likely, Florida. (X 1 1/4)

Map showing the distribution of the races of *Aptenopedes aptera* and the new species here described.

1. *aptera simplex.* Limited to near coast.
2. *aptera borealis.* (Dots.)
   (Note single isolated record.)
3. *aptera aptera.* (Crosses.)
4. *aptera saturiba.* (Dot.)
5. *aptera coquinae.* (Dots.)
6. *hubbelli.* (Triangles.)
7. *nigropicta.* (Circle.)
8. *robusta.* (Circle.)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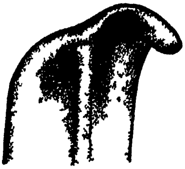
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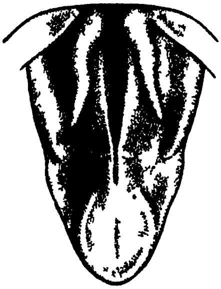
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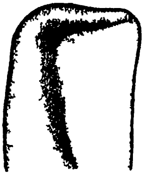
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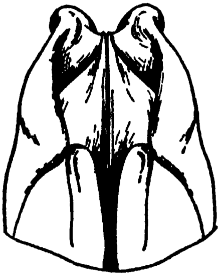
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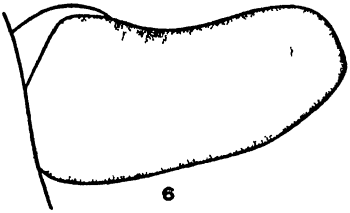
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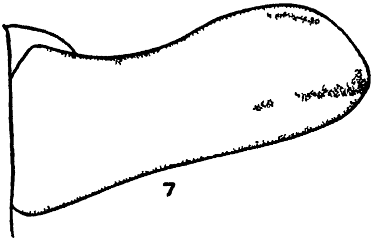
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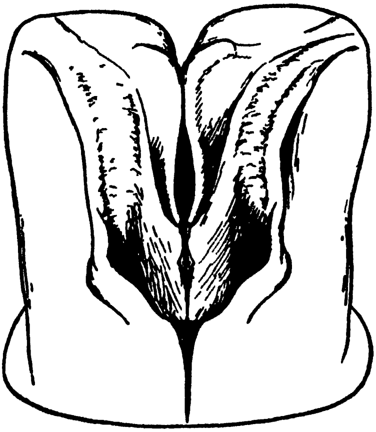
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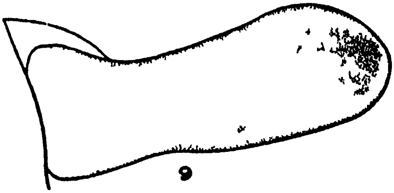
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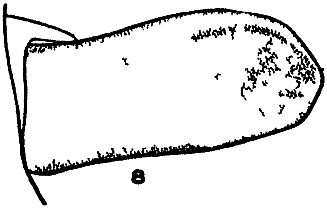
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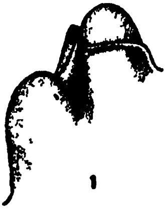
HEBARD—NORTH AMERICAN MELANOPLI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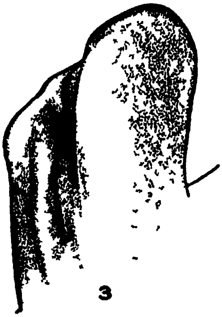
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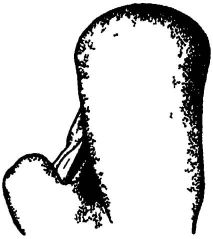
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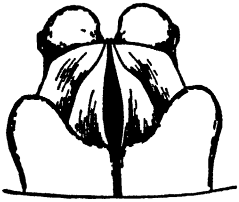
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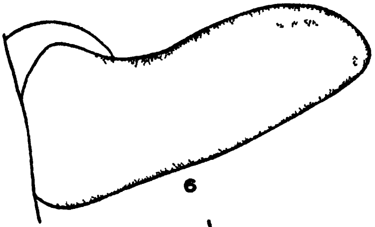
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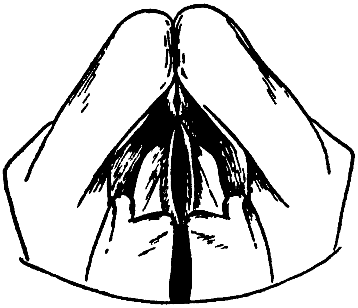
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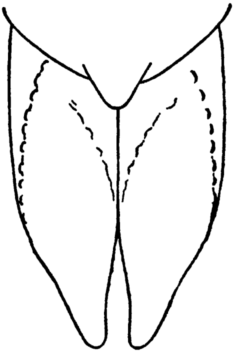
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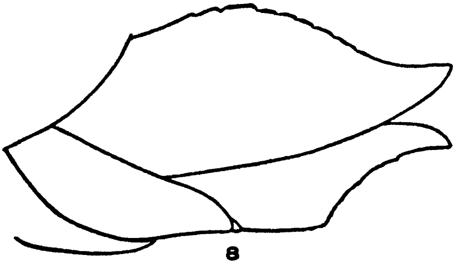
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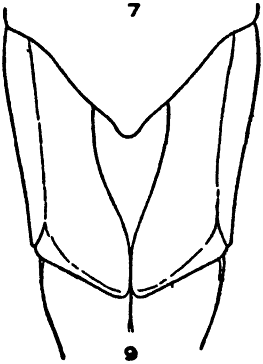
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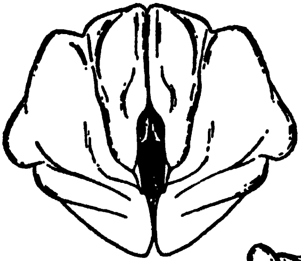

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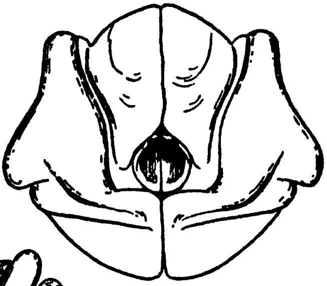

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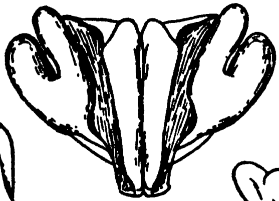

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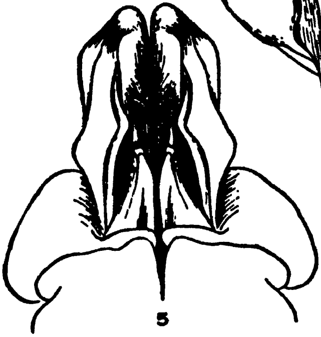

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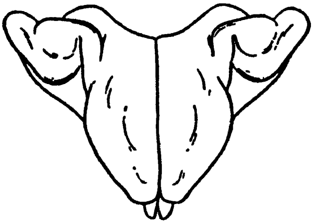

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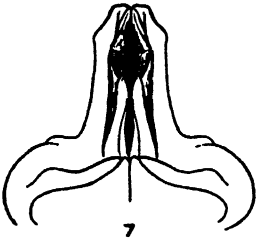

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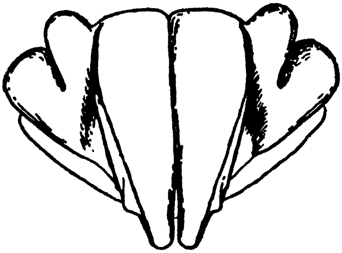

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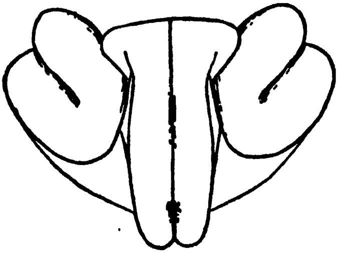

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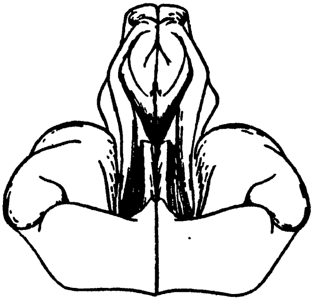

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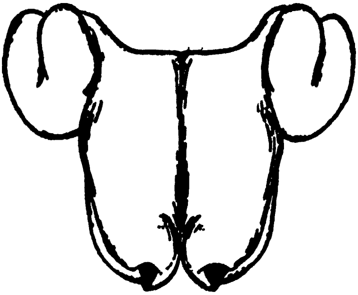
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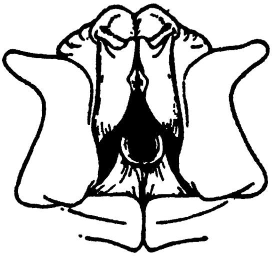
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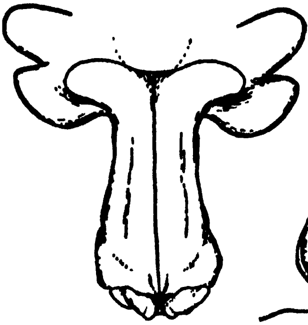
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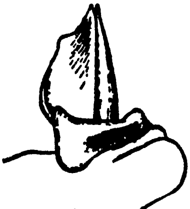
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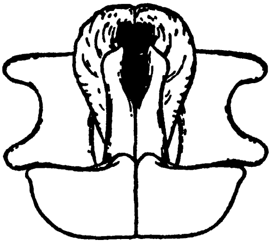
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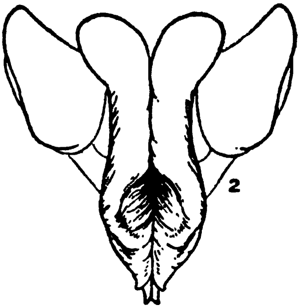
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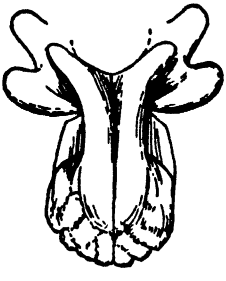
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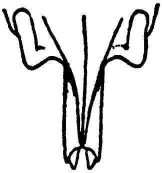
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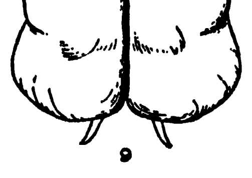
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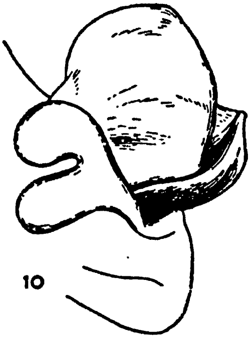
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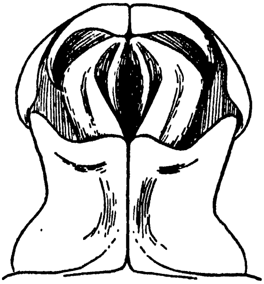

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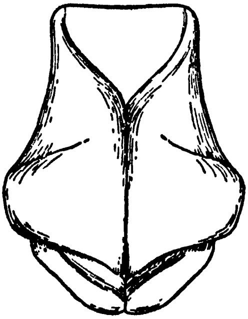

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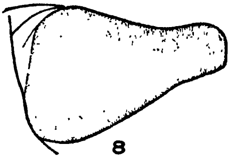

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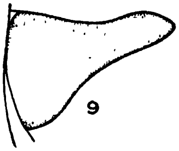

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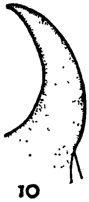

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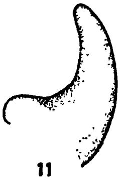

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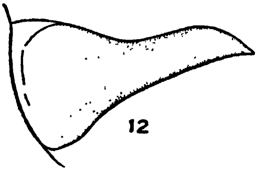

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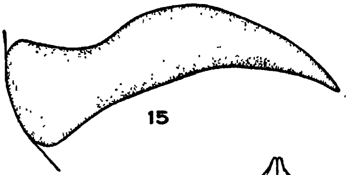

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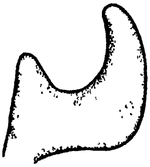

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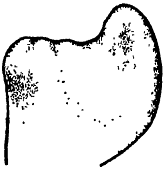

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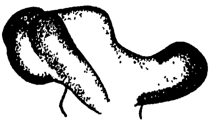

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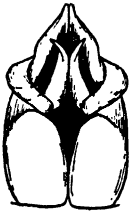

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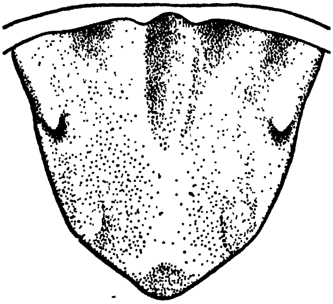

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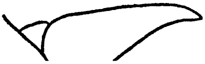

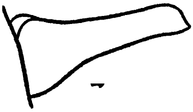

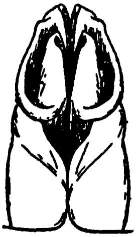

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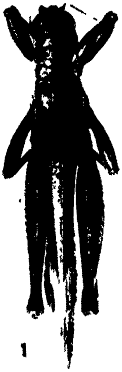
HEBARD—NORTH AMERICAN MELANOPLI



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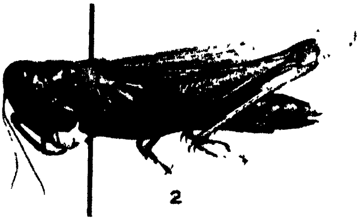

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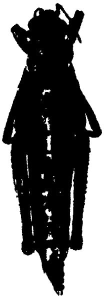

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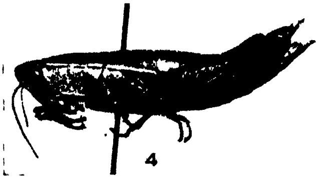

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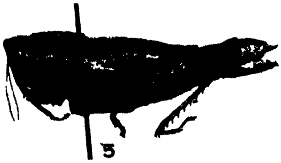

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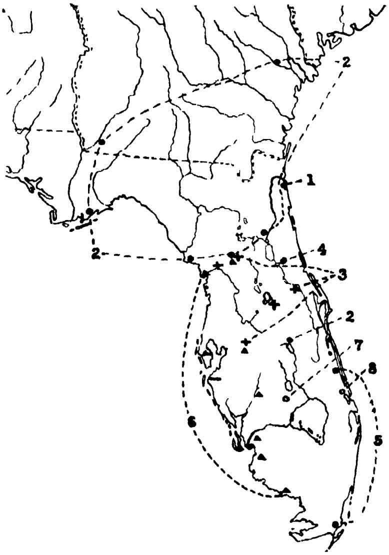

HEBARD—NORTH AMERICAN MELANOPLI

TWO NEW SPECIES OF EUSCHIDES

(COLEOPTERA: TENEBRIONIDAE)

BY FRANK E. BLAISDELL, SR.

Stanford Medical School and Associate in Research, California Academy of Sciences, San Francisco, California

The following study is the outcome of an examination of large series of specimens of Euschides belonging to the Costipennis Group (Group III of Casey[1]). Thos. L. Casey has presented some very pertinent facts regarding the structural characteristics of the different groups of the Asidini as defined by him.

From the material at hand it is evident that *Euschides captiosa* Horn is not to be associated with *Euchides angulatus* LeConte as has been done by Casey; for while the general form of the two species is strikingly imitative of *Eleodes*, he acknowledges that the main difference separating them is that *angulatus* has the sides of the pronotum dilated and bluntly angulate, while in *captiosa* the pronotal sides are evenly and strongly arcuate and, that in both the elytral sides behind the humeri are broadly rounded (as viewed in transverse section). It is to be noted that the elytra in the species of the *angulatus* group (*angulatus* LeConte and *cressoni* Blaisdell) never acquire cariniform margins at and behind the humeri, while in *captiosa* cariniform margins develop in differing degrees in all of its variants and, in the extremes exhibit nascent or evanescent costae as in the extreme variants of *costipennis* LeConte. It is a fact, that specimens of *captiosa* with absolutely smooth and rounded post-humeral sides are in marked minority as compared with specimens that exhibit more or less transverse rugosity just behind the humeri, which in a series gradually develop the cariniform margins—such forms as Casey has associated with *captiosa* in his treatment of the *Euschides*;[2] the study of those forms of *captiosa* shows that they lead to the extreme forms of *costipennis*—such resemblances are analogous and indicate the relationship of the species.

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[1] Mem. Coleop., III, p. 144, 1912.

[2] Mem. Coleop., III, p. 131, 1912.

The species of *Euschides* are distributed over a large geographical area—Casey has written: " Our territories west of the 100th meridian are very broken, and include many isolated mountain crests and valleys having between them no direct communication. Within these local environments primitive stocks become modified in the course of time, if the isolation has been sufficiently long continued and the evolutionary stimuli potent enough, may result in forms so distinct as to demand recognition as subspecies, species or even genera."

The above remarks may well be applied to the region west of the Sierra Nevada Mountains. The new species described below has been collected in apparently isolated areas, by Roy L. Wagner, of Fresno, California, as will be stated later and to whom the writer is indebted for the privilege of studying large series.

There is no doubt but what inherent plasticity is a factor in the evolution and differentiation of a species, while fortuitous variation affects only individuals. The individuals of a subspecies inhabit a region apart from that of the type species, reproduce true to form, more or less influenced by the local environment; at the periphery of their isolated distributional area they may intermix with units of another species or subspecies.

Recent research in the rearing of species of *Coniontis*[3] has determined that seasonal forms are to be recognized. These phases must be determined by rearing of a species and not by assumption or superficiality of observation, for they constitute the truly puzzling so-called "polymorphous aggregate". The adults of *certain species* may hibernate through succeeding seasons (favorable or unfavorable) and may live for two or three years. The larvae that develop from eggs laid by each female are predestined to live through and to pupate at different seasons for a period of two or three years according to the species. Therefore, adults of the same species will present different facies and characters according to the degree of longevity of the larvae.

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[3] Ent. News, XLVI, p. 119, 1935.

At the present time two new species or subspecies are described as follows:

Euschides speculatus new species

Form dissimilar in the sexes, dimorphic, both very sparsely pubescent. Pubescence fulvous in color, hairs more or less equal in length to the eleventh antennal segment, most noticeable in the female; appressed to the surface on head and pronotum, shorter and recumbent on the legs; somewhat finer and more or less irregularly directed on the elytra.

Male.—Form elongate-oblong, about two and two-thirds times as long as wide, pronoto-elytral junction about one-third narrower than width of pronotum. Color deep black, surface highly polished and very shining; head and pronotum duller and somewhat alutaceous, punctation moderately coarse.

Head twice as wide as long before the post-ocular line, labrum excluded; eyes somewhat strongly convex, slightly more prominent than sides of the frons, the latter evenly arcuate and slightly convergent to the oblique sutures, there emarginate with the sides of the epistoma, the latter short, slightly transversely arcuate, sides arcuate, apex truncato-sinuate. Frons rather broadly and somewhat deeply impressed on the frontal suture, more feebly so on the finely linear and inwardly arcuate oblique sutures, thence flat becoming more convex on the vertex; supra-antennal convexities moderately prominent, a more or less linear groove passes from each preocular impression toward the sides of the middle third of the vertex, or at times arcuately and irregularly across the interocular surface, a more or less evident irregular fovea may be present on the median line; punctures separated by a distance equal to their diameter or less and with scattered interstitial punctules. Labrum convex and the sides arcuately continuous with the apex, the latter very narrowly and rather deeply emarginate at middle. Margins of the epistoma and labrum fimbriate with golden setiform hairs, denser on the latter. Antennae slender, about a fifth shorter than the pronotal width; segments eight, ninth and tenth gradually widened and compressed, second small and as wide as long, third elongate and subcylindrical, four times as long as second; fourth subcylindrical and one-half of its length shorter than third; segments five to the eighth inclusive, quite equal in length and about as long as wide; fifth to the seventh obtrapezoido-triangular with sides more arcuate, eighth similar, a little larger and wider; ninth transversely subtriangular with sides broadly arcuate and converging to base, tenth not wider and suboval, with sides strongly arcuate and less convergent toward base; eleventh short, distinctly smaller and one-third narrower than the tenth.

Pronotum about one-half wider than long and quite as wide as the elytra, base equal to apex; the latter broadly and evenly emarginate between the angles, the latter prominent, obtuse and fimbriate with black setae; sides evenly and rather strongly arcuate; base not beaded, broadly and moderately lobed, more prominent posteriorly than the angles, feebly sinuate or truncate opposite the scutellum, not strongly sinuate laterally within the obtuse angles. Disk moderately convex, more or less broadly and feebly impressed at middle against the base, punctures coarser and denser laterally than in the central area, where they are smaller and separated by a distance equal to one to four times their diameters, intervals with scattered and very minute punctules; lateral submarginal area concavo-explanate, the less than moderately reflexed margins punctato-rugose and about equal in width to length of fifth antennal segment, margin punctato-crenulate, not beaded and somewhat thinner than in the opposite sex.

Propleura convex, more or less impressed before the coxal convexities; sparsely, rather coarsely punctate and somewhat rugose.

Elytra oblong-subovate, widest at or a little behind the middle, about three-fourths longer than wide and quite three times as long as the pronotum; base equal in width to that of the prothorax, humeri obtuse, angles not prominent; sides broadly and evenly arcuate, moderately convergent in basal three-fourths, thence convergent to the rather narrowly rounded and feebly lobed apex. Disk ecostate, rather more than moderately convex, obliquely and arcuately declivous in apical fourth, smooth, highly polished, obsoletely and sparsely punctulate, and with scattered minute hairs; abruptly deflexed laterally, except in about apical sixth; angle of deflexion cariniform, slightly thickened and bead-like, incurved on apical declivity, crenulate behind the humeri and more or less transversely, irregularly creased. At times vestigial costae are more or less slightly indicated. Deflexed sides nearly vertical and slightly inflexed, feebly convex and very finely, subobsoletely punctulate. Scutellum small, triangular, impunctate between the elytra and densely punctate at base. Epipleurae not defined, except opposite the last two abdominal segments. Sterna and parapleurae sparsely punctate, punctures small.

Abdomen less than moderately convex, surface alutaceous and extremely densely and microscopically crinkled with punctures scarcely discernible on first three segments, last two smooth, more shining, distinctly punctate and with interstitial punctules. First segment on the median line about as long as the combined lengths of fourth and fifth, behind the coxae as long as third at middle; second segment as long as fifth and about twice as long as fourth and almost one-half longer than third.

Legs slender, middle and posterior femora very feebly and gradually clavate, the anterior slightly stouter and not clavate. Femora densely punctato-rugose, rugae transverse; tibiae and tarsi very slender. Metafemora three-fifths as long as the elytra, equal in length to the metatibiae; profemora about three-fourths as long as metafemur. Metatarsi about two-thirds as long as their tibia, first segment as long as fourth and twice as long as the second, the latter a little longer than third.

Female.—A little more robust, a little more than twice as long as width of elytra, the latter costate and more pubescent. Antennae shorter, scarcely as long as the pronotum, also equal in length to the profemora. Punctation stronger. Pronotum less than a half wider than long. Elytra two-fifths longer than wide and three times as long as pronotum; each bicostate, costae not strong, ogival and variable in prominence; on each elytron indistinctly uniting anteriorly and scarcely attaining the base, arcuately uniting on the declivity at about apical fifth and more or less obscurely with the incurving cariniform margin at about apical eighth, the margin strong throughout; concave intervals shallow and equal. Legs slender and less elongate. Abdomen more convex, first segment behind the coxae equal to length of third as well as to that of the fifth and, on the median line equal to the combined lengths of third and fourth; second segment one-fourth longer than third, the latter twice as long as fourth.

Measurements.—(Types) Length, 14 to 16 mm.; width, 5 to 6 mm.

Holotype.—Male; Tipton, Tulare County, California. March 1, 1931. (Roy S. Wagner). [Cal. Acad. Sci., no. 4124].

Allotype.—Female; taken with type. [Cal. Acad. Sci., no. 4125].

Paratypes.—150 specimens; taken with type; in the author's collection at the Museum of the California Academy of Sciences, and in the collections of The American Entomological Society, U. S. Museum and of Mr. Roy S. Wagner.

Euschides lecontella new species

Form similar in the sexes, not pubescent, each puncture with a very small piceous and very inconspicuous seta. Elytra costate in both sexes. Color black, luster dull and alutaceous to slightly shining.

Male.—Form elongate—oblong, about three times as long as wide, pronoto-elytral junction about one-third narrower than width of pronotum.

Head twice as wide as long before the post-ocular line, labrum excluded; eyes somewhat strongly convex, slightly more prominent than sides of front, the latter evenly arcuate and parallel, rounding rather suddenly inward to the position of the oblique sutures, there emarginate with the short, arcuate and slightly convergent sides of the epistoma, the latter short, slightly transversely arcuate, apex broadly sinuate with angles rounded. Frons rather deeply and broadly impressed on the frontal suture, more feebly so on the finely linear and inwardly arcuate oblique sutures; more convex on vertex, thence the surface gradually declivous to bottom of the depression; supra-antennal convexities moderately convex, not prominent and somewhat declivous against the eyes, from which point on each side a linear impression passes backward and inward to each side of the vertex; punctures of the central area small and widely spaced, interstitial punctules present, denser and coarser laterally and on the epistoma. Labrum as in *speculatus,* marginal setiform hairs inconspicuous. Antennae slender, about a fifth shorter than the pronotal width; segments eight, ninth and tenth very gradually wider and moderately compressed; second segment small, as wide as long and slightly obconical to annular, third elongate and subcylindrical, four times as long as second; fourth subcylindrical and one-half of its length shorter than third; segments five to eight inclusive quite equal in length and quite as long as wide; fifth to the seventh subcylindrico-obconical, eighth a little larger and rather obtrapezoidal, ninth transversely subtriangular and a little wider than long; tenth more abruptly transverse and twice as wide as long, eleventh short, truncate at apex and narrower than the tenth.

Pronotum transverse, one-half wider than long and equal to width of elytra; apex broadly and evenly emarginate between the moderately prominent angles, the latter obtuse and fimbriate with black setiform hairs; sides evenly and strongly arcuate; base not beaded, slightly and broadly lobed, feebly sinuate opposite the scutellum and laterally within the very obtuse angles, in width equal to the apex. Disk moderately strongly convex, sometimes with paramedian oval impressions against the base; central area with small and rather widely spaced simple punctures, that become somewhat larger and denser laterally; lateral submarginal area concavo-explanate; the explanate margin less than moderately reflexed and about equal in width to the sixth antennal segment, rugoso-punctate, the free edge visible from above and punctato-crenulate, not noticeably thickened.

Propleura moderately convex, more or less feebly impressed before the coxal convexities; smooth, punctures small and very sparse, larger against the prosternal sutures.

Elytra elongate oval, parallel and twice as long as wide, widest at or a little behind the middle, three times as long as the pronotum; base equal to that of the prothorax, humeri obtusely subdentiform; sides broadly and evenly arcuate, noticeably more or less convergent in basal one-half, in about apical third arcuately convergent to the moderately narrowly rounded and feebly lobed apex. Disk moderately convex, obliquely and arcuately declivous in apical fourth, abruptly deflexed laterally, except in apical sixth, angle of deflexion cariniform and incurved on apical declivity; the thickened margins crenulate behind the humeri, less so apically, the submarginal impressions subrugose against the margins. Each elytron bicostate, costae not sharply ogival but narrow and obtusely rounded at summit, more or less united anteriorly but not quite attaining the base; arcuately united on the declivity at about apical fifth and by a more or less arcuate extension uniting with the incurved cariniform margin at about apical eighth, the cariniform margin strong throughout; intervals equal and moderately concave, punctules very sparse and evanescent; sutural margins slightly raised and flat. Scutellum triangular, small, impunctate apically, densely punctate toward base. Deflexed sides nearly vertical and slightly inflexed, feebly convex and obsoletely punctulate. Epipleurae not defined, except feebly so at times opposite the last two abdominal segments.

Abdomen moderately convex apically, less so basally; first three segments microscopically crinkled, finely and very sparsely punctate, punctures finely muricate; distal two segments somewhat more shining, punctures larger and less sparse. First segment behind the coxae as long as third, on the median line as long as the fourth and fifth together; second twice as long as fourth and one-half as long as fifth.

Legs very slender, gradually increasing in length, the anterior shortest and stoutest, the posterior elongate; middle and posterior femora feebly and gradually clavate. Metatibiae about two-fifths of their length longer than a protibia. Metatarsi three-fifths as long as their tibia, first segment equal to the second and third together, second one-third longer than third, fourth equal to the combined lengths of first and second.

Female.—Form more robust, elytra more or less wider than the pronotum, the latter a fifth wider than long and the punctation coarser. Antennae in length two-thirds the width of the pronotum. Elytra frequently widest behind the middle and about twice as long as wide. Legs less elongate and slender. Abdomen more convex, second segment one-half longer than third, the latter not quite twice as long as fourth; fifth longer than in the male and twice as long as the fourth. Otherwise the sculpturing and punctation as in the male.

Measurements.—(Types) Length, 13 to 16 mm.; width, 5 to 6.5 mm.

Holotype.—Male; Jameson, Fresno County, California. January 8, 1931. (Roy S. Wagner). [Cal. Acad. Sci., no. 4126].

Allotype. — Female; taken with type. [Cal. Acad. Sci., no. 4127].

Paratypes. — 167 specimens; taken with type; in the collections of the author, of The American Entomological Society, of the U. S. National Museum and of Mr. Roy S. Wagner.

An extreme variation may be defined as follows:

Euschides lecontella tempestalis new variety

As in the female of *lecontella* except that the elytral costae are obsolete, and appear as rather broad, faint longitudinal convexities; surface of the elytra more or less obsoletely rugulose, at the sides on and within the cariniform margins not or scarcely transversely rugose. Several specimens seen.

Measurement.—(Type) Length, 15 mm.; width, 7 mm.

Holotype. — Female; Jameson, Fresno County, California. January 8, 1931. (Roy S. Wagner). [Cal. Acad. Sci., no. 4128].

Regarding *speculatus* and *lecontellus* Mr. Wagner writes very interestingly:

The Tipton species is sexually dimorphic, males narrower with polished dorsum and more robust females, opaque and costate. The long pubescence alone separates this species at once from any other of the genus found in the valley here. Many specimens have been taken *in coitu.* During its season it is very numerous and coeval with *Pocalta ursina* and *Calosoma latipennis* var. *opimus* Casey. However, so far as I have observed it is confined in habitat to the Tipton area.

Lecontella taken at Jameson, Fresno County, California, has essentially the same kind of habitat, i.e., desert. Many pairs were taken *in coitu.* Its habitat seems to be restricted to that locality.

The distance between Tipton and Jameson—in direct line—is about 70 miles, with no material barrier between, unless the Kings River be considered as such.

It would appear that a river, such as the Kings, could act as a definite barrier against diffusion and intermingling of such wingless and epigeal species; this may possibly account for their specific divergence.

Speculatus is very distinct by the dissimilarity of the sexes and differences in facies. *Lecontella* has the elytra costate in both sexes, the size is smaller and the facies is not that of the larger *costipennis* LeConte. Both species can only be compared with the latter, which is of much larger average size, elytra usually more parallel to elongate oval and strongly costate in the typical form. *Lecontella* var. *tempestalis* can only be compared with *compressa* Horn, *evanescens* Casey and *neutralis* Casey. *Evanescens* is identical with *compressa.* I have before me a photograph of the type of *compressa* that Mr. E. T. Cresson, Jr., of the Entomological Department of the Academy of Natural Sciences of Philadelphia, had prepared for me; also, specimens of *evanescens* and *neutralis* that have been compared with the types in the Casey collection, by Dr. Edw. A. Chapin of the Entomological Department of the United States National Museum, all of which are much larger and of quite different facies. *Tempestalis* has the same relationship to *lecontella* that *compressa* Horn (Syn. *evanescens* Casey) and *neutralis* Casey have to *costipennis* Leconte. The introductory remarks given at the beginning of this paper suggest the relationship of these analogous forms. A review of the species of Euschides belonging to the Costipennis Group is being prepared.

STUDIES IN ORTHOPTERA WHICH OCCUR IN NORTH AMERICA NORTH OF THE MEXICAN BOUNDARY

VI. A REVISION OF THE GENUS ARETHAEA (TETTIGONIIDAE, PHANEROPTERINAE) *

BY MORGAN HEBARD

(Plates XVIII and XIX)

There has always been to the author a particular interest in this Sonoran genus, found exclusively in the southern half of the western United States and northern Mexico, as a rule in semi-arid environment, with the exception of the largest of all the species, which occurs in the wire-grass of the pine woods of the southeastern United States.

All of the species are small and slender, light green in coloration, with organs of flight very narrow when fully developed and limbs amazingly thin and elongate. Usually macropterous, the males of only a single species have the organs of flight decidedly reduced in a portion of its area of distribution. Females of some species are similar in this respect, while in a few species they are always highly brachypterous.

Living in tufts of grasses, usually of the very narrow-leaved varieties, the resemblance of individuals to their favorite environment is amazing. They often rest motionless, in or on such tufts of grass, with legs spraddled out and the very slender and elongate antennae, which frequently are pale yellowish, drifting in the breezes. When flying, individuals appear almost helpless, drifting with the wind with legs still spraddled out and wings feebly fluttering. When on the ground away from grass they seem almost as feeble, standing high but unsteadily, while their leaps are short and weak.

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* Parts IV-V. Trans. Am. Ent. Soc., LX, pp. 281-293, (1934).

In 1914 eleven species and races of the genus *Arethaea* were recognized by Rehn and Hebard. It is a distinct surprise to find that nineteen are present in the collections now available. In the United States the species and races are now quite well understood, but much field work remains to be done in northern Mexico where the genus is very widely distributed and where adequate field work may reveal the presence of several more yet unknown species and races. Until much more material from that region is assembled the southern boundaries of a number of species and races can not be determined.

In the present paper it is our desire to describe the yet unrecognized forms before us, to correct confusion which occurred in our studies of 1914 (due to lack of sufficient material to recognize certain geographic races and in one case incorrect association of the sexes), to record all subsequent material that has not already been reported (except that from Texas, which will shortly appear in a study of the Orthoptera of that State) and to provide a discussion and key which will enable the student to see not only the inter-relationship of the species and races more clearly but also to recognize more easily the characters which may safely be used to distinguish them.

The natural sequence of the species in this genus is as follows:

semialata Rehn and Hebard. Extreme western Texas and southcentral New Mexico.

coyotero Hebard. Southern Nevada and northwestern Arizona.

gracilipes gracilipes (Thomas). Southern Colorado, western Oklahoma, Pan-Handle of Texas, New Mexico and northeastern Arizona.

gracilipes papago Hebard. Southern and western (at low elevations) Arizona, northern Sonora and the southeastern border of California.

gracilipes cerciata new subspecies. Big Bend region of southwestern Texas.

constricta comanche new subspecies. Central and southern Texas, Nuevo Leon and Coahuila.

constricta constricta Brunner. Nebraska south across northern Texas to the Pan-Handle.

insaroides Rehn and Hebard. Southern Coahuila.

mescalero new species. Southeastern New Mexico.

arachnopyga Rehn and Hebard. Big Bend region of southwestern Texas.

phantasma Rehn and Hebard. South-central (not including Brownsville region) Texas.

sellata Rehn. Southern Arizona.

carita Scudder. Central-northern New Mexico to northern Chihuahua and southeastern Arizona.

polingi Hebard. Northwestern Arizona.

brevicauda (Scudder). Southern Nevada, northwestern Arizona, southern California.

limifera Rehn and Hebard. Northern Jalisco.

grallator (Scudder). Almost entire central and western portion of east Texas.

phalangium (Scudder). Georgia and Florida.

ambulator new species. North-central Texas.

Characters which are particularly distinctive:

For Both Sexes

Margins of pronotum strikingly nodose; *phantasma.*

Pronotum with a fine medio-longitudinal buffy line; *grallator.*

Cephalic and median femora angularly produced dorso-distad; *grallator, phalangium, ambulator.*

For Males

First abdominal tergite not specialized; *semialata, coyotero, sellata, grallator, phalangium, ambulator.*

Supra-anal plate highly specialized; *arachnopyga.*

Cerci bent inward and dorsad; *mescalero.*

Cerci with a prominent convexity at base of apical tooth; *mescalero.*

Cerci curving evenly inward in distal portion; *sellata, polingi, brevicauda, limifera.*

Organs of flight sometimes showing considerable reduction in this sex; *ambulator.*

Tegmina with stridulating field at apex of stridulating vein strongly produced, *carita, polingi;* very strongly produced, *brevicauda, limifera.*

For Females

Organs of flight very greatly reduced, shorter than pronotum; *sellata, polingi, brevicauda.*

Organs of flight considerably reduced but much longer than pronotum; *semialata, gracilipes gracilipes* (only in some series), *arachnopyga, carita.*

In a number of species females are very difficult to distinguish, but in the others are quite as readily recognized as the males. The following key gives the important features of difference for each sex.

1. Femora not specialized distad. Eyes less than twice as deep as wide..2
   Cephalic and median femora compressed dorso-distad, there angularly produced, subspiniform dorsad. Eyes more than twice as deep as wide. (Male cerci strongly bent horizontally inward distad. Male with first abdominal tergite not specialized. Pronotum with caudal margin of disk angulate produced. Stridulating field of male tegmen roundly and weakly produced at apex of stridulating vein.)........17
2. Stridulating field of male tegmen weakly to moderately produced at apex of stridulating vein. Male cerci strongly bent distad. (Abdominal tergites smooth to feebly crenulate.).....................3
   Stridulating field of male tegmen strongly to very strongly produced at apex of stridulating vein. Male cerci weakly or not at all bent, but curved, inward distad, (the distal tooth slender and tapering. Male supra-anal plate simple. Abdominal tergites with caudal margins simple to moderately strongly nodulose).........................13
3. Male with first abdominal tergite not specialized....................4
   Male with first abdominal tergite specialized........................6
4. Abdominal tergites with caudal margins smooth to subcrenulate. (Pronotum with caudal margin of disk convex, showing very weak angulation. Male cerci with inbent apical portion produced as a small conical tooth. Organs of flight caudate in male, reduced and not reaching beyond apex of ovipositor in female.) Western Texas.
   semialata Rehn and Hebard
   Abdominal tergites with caudal margins very strikingly nodose. (Pronotum with caudal margin of disk convex. Organs of flight caudate in both sexes.)...5
5. Pronotum very weakly sellate, its margins simple. Size large and form less graceful. Male cerci with distal bent portion directed inward and dorsad. Southeastern New Mexico........*mescalero* new species
   Pronotum decidedly sellate, its margins strikingly nodose. Size smaller, form very graceful. Male cerci with distal bent portion directed inward. South-central (not including Brownsville region) Texas.
   phantasma Rehn and Hebard
6. Stridulating field of male tegmen broadly convex at apex of stridulating vein. (Male with production of caudal margin of pronotum and specialization of first abdominal tergite much as in *gracilipes papago*, cerci heavier distad.) Southern Coahuila.
   insaroides Rehn and Hebard
   Stridulating field of male tegmen moderately produced and angulate at apex of stridulating vein.....................................7
7. Pronotum with caudal margin of disk convex or rounded obtuse-angulate, but never acute-angulate produced. Sutural margins of tegmina not conspicuously darkened, the principal veins near that margin no paler than the intervening areas......................8

Pronotum with caudal margin of disk sharply angulate produced at slightly to distinctly less than a rightangle. Sutural margins of tegmina usually conspicuously darkened, the principal veins near that margin usually paler than the intervening areas..................12

8. Pronotum with caudal margin of disk broadly convex, showing no angulation. Male cerci with inbent apical portion a comparatively slender tooth which is no wider proximad than mesad. (Male with specialization of first abdominal tergite moderately high, about as wide as its basal width. Organs of flight caudate in male, very greatly reduced and much shorter than pronotum in female.[1]) Southern Nevada and Arizona Plateau..................*coyotero* Hebard

Pronotum with caudal margin of disk bluntly angulate produced, forming a rounded weakly obtuse angulation or rectangulate, (except sometimes in *gracilipes cerciata*). Male cerci with margins of inbent apical portion converging to form a stouter tooth...................9

9. Male with specialization of first abdominal tergite not as high, height no greater or slightly less than its basal width, its apex not bulbous. (Male cerci with inbent apical portion moderately stout, weakly horizontally flattened, its margins converging to form a stout acute tooth.)..10

Male with specialization of first abdominal tergite very high, higher than its basal width, with apex bulbous. (Female with organs of flight varying from as caudate as in male to reduced, not surpassing apex of ovipositor.) Southern Colorado, western Oklahoma, Pan Handle of Texas, New Mexico and northeastern Arizona.
gracilipes gracilipes (Thomas)

10. Male supra-anal plate normal for genus. (Organs of flight caudate in both sexes.)..11

Male supra-anal plate highly specialized, elongate, recessed into the preceding tergite and medio-longitudinally deeply sulcate, the lateral halves with surfaces convex. (Organs of flight caudate in male, only slightly surpassing apex of ovipositor in female.) Big Bend of the Rio Grande, southwestern Texas......*arachnopyga* Rehn and Hebard

11. Male cerci with inbent apical portion moderately stout, horizontally flattened, its margins converging to form a stout acute tooth. Southern and western (at low elevations) Arizona, northern Sonora, extreme southeastern California..............*gracilipes papago* Hebard

Male cerci with inbent apical portion much broader, very decidedly horizontally flattened, its margins broadly convex and convergent only at extremity to form a much shorter tooth. Big Bend of the Rio Grande, southwestern Texas....*gracilipes cerciata* new subspecies

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[1] This sex is readily separated from females of other species which are as strongly brachypterous by the much longer ovipositor which curves gradually instead of being bent dorsad.

12. Male cerci with inbent apical portion comparatively slender, horizontally flattened, its margins converging to form a stout acute tooth. Organs of flight caudate, never showing more than very slight reduction. Central and southern Texas, Nuevo Leon and Coahuila. *constricta comanche* new subspecies

    Male cerci with inbent apical portion stouter, decidedly horizontally flattened, its margins converging to form a decidedly heavier acute tooth. Organs of flight caudate, but often showing slight to fairly marked reduction, particularly in more northern material. Eastern Nebraska south across northern Texas to the Pan Handle. *constricta constricta* Brunner

13. Male with first abdominal tergite not specialized. (Male tegmina with stridulating field strongly but quite broadly produced at apex of stridulating vein. Pronotum with caudal margin of disk rounded subrectangulate produced. Abdominal tergites with margins simple. Male cerci showing an even distal curvature. Organs of flight fully caudate in male, very greatly reduced and much shorter than pronotum in female.[2]) Southern half of Arizona at lower elevations, but particularly extreme southeastern section..........*sellata* Rehn

    Male with first abdominal tergite specialized........................14

14. Male tegmina with stridulating field strongly but quite broadly produced at apex of stridulating vein................................15

    Male tegmina with stridulating field very strongly and narrowly produced at apex of stridulating vein. Caudal margin of pronotal disk never sharply acute; lateral lobes with area of convex callosity sometimes inflated..16

15. Pronotum with caudal margin of disk well rounded angulate produced at slightly more than a rightangle. Abdominal tergites with margins feebly to rather strongly nodose. Male cerci showing some slight angulation of their distal curvature. Male with caudal margins of first abdominal tergite strongly elevated with outline of these portions convex to the meso-caudal specialization. Organs of flight fully caudate in male, less than half as long as abdomen in female. Central-northern New Mexico to northwestern Chihuahua and southeastern Arizona......................................*carita* Scudder

    Pronotum with caudal margin of disk rounded angulate produced at slightly less than a rightangle. Abdominal tergites with caudal margins not nodose but showing angulate production meso-laterad. Male cerci showing an even distal curvature. Male with caudal margins of first abdominal tergite much less elevated on each side of the meso-caudal specialization. Organs of flight fully caudate in male, very greatly reduced and much shorter than pronotum in female.[3] Arizona Plateau...........................*polingi* Hebard

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[2] The females are exceedingly similar to those of *polingi*, but apparently have the ovipositor slightly more strongly bent dorsad.

16. Limbs elongate. Male tegmina with production at apex of stridulating vein not equal to width of remaining portion of field. Marginal field of tegmina normal. Male cerci more robust. Abdominal tergites with caudal margins smooth. Organs of flight fully caudate in male, very greatly reduced and much shorter than pronotum in female. Southern Nevada, northwestern Arizona and southern California.[4] *brevicauda* (Scudder)

Limbs very elongate. Male tegmina with production at apex of stridulating vein subequal in length to width of remaining portion of field. Marginal field of tegmina more strongly developed. Male cerci more slender. Abdominal tergites with caudal margins strongly crenulate. Organs of flight fully caudate in male; female unknown. Northern Jalisco..................................*limifera* Rehn and Hebard

17. Pronotum shorter, stridulating area of male tegmina nearly as long. Pronotum with a fine medio-longitudinal buffy line. (Organs of flight caudate, tegmina not widening beyond proximal third. Abdominal tergites with caudal margins smooth. Male cercus much like that of *phalangium*.) Almost entire central and western portion of east Texas...*grallator* (Scudder)

Pronotum longer, stridulating area of male tegmina conspicuously shorter. Pronotum lacking a medio-longitudinal line.............18

18. Male cercus not showing a rounded projection before base of the small apical tooth. Pronotum with humeral sinus broad and shallow. Organs of flight caudate, tegmina widening beyond proximal third. Abdominal tergites with caudal margins smooth. Size largest of the genus. Georgia and Florida..................*phalangium* (Scudder)

Male cercus showing a rounded projection before base of the small apical tooth. Pronotum with humeral sinus very broad and very shallow. Organs of flight often considerably reduced in both sexes, when caudate the tegmina do not widen beyond proximal third. Abdominal tergites with caudal margins strongly crenulate. Size smaller and form slender, though large and robust for the genus. North-central Texas.........................*ambulator* new species

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[3] The females are very similar to those of *brevicauda*, but the ovipositor is distinctly shorter and is definitely bent dorsad. Even more similar are those of *sellata*, in which the ovipositor is apparently slightly more strongly bent dorsad.

[4] Excepting the Mojave Desert and adjacent regions including Death Valley and the Imperial Valley, over all or the greater portion of which country the genus *Arethaea* is absent or extremely scarce.

The form of the apices of the cephalic and median femora is the most important character for dividing the species of the genus. Such specializations we now know instantly distinguishes individuals of the Grallator Group from all others even in the very early stages of immaturity.

Presence or absence of a gland-like specialization on the first abdominal tergite in males has no value in associating species with their nearest relatives. Whether the male cerci are bent or curved distad has more significance (except for the species *sellata* and *carita* which in certain other features show affinity) as is true for the degree of production of the stridulating field of the male tegmina at the apex of the stridulating vein (except for *insaroides*, which in a number of characters shows otherwise close affinity to *gracilipes*). Whether the caudal margins of the abdominal tergites are simple, crenulate or nodose is often of diagnostic value, but some individual variation occurs.

The distribution of *Arethaea* covers the semi-arid southern half of the western United States and northern Mexico, a single species being peculiar to Georgia and Florida in the southeastern United States. Limited in continuous distribution eastward to the western border of the narrow humid strip of eastern Texas, the northern boundary is almost a straight line across southwestern Kansas, southern Colorado, southern Nevada and California to the Pacific, but in the eastern portion there is an intrusion into the north which, including eastern Kansas, reaches northeastern Nebraska. In Mexico we are now certain that the genus is present only as far south as northern Jalisco, where a single, possibly isolated, species occurs. ·Insufficient field work has been done to outline a southern boundary accurately, but *Arethaea* should be found generally distributed (except at high elevations) as far south as the Tropic of Capricorn.

All of the species live in grasses and weeds near the ground, many in the small clumps of fine short grass of the semi-arid sections of the southwestern United States and northern Mexico. Usually found singly and often not more than one or two in a day's collecting, individuals may occasionally be present in fair numbers in local areas of favorable environment. Females of a number of species can not fly, and when sustained flight is possible individuals take wing almost exclusively at night, for all of the species are nocturnal. Occasional specimens fly to light at night, but series can be obtained in this way only through the efforts of a resident collector which can be continued throughout the season in a favorable environment.

Hiding in grasses and weeds during the day, the color and form of specimens of *Arethaea* is such that, had beating not been resorted to, we would again and again have missed finding them at localities where our stay was limited.

Much material has been furnished us for study through the cooperation of other Institutions, to whose Curators we wish to express deep gratitude. Unless otherwise stated, the material here recorded belongs to the author's collection, at the Academy of Natural Sciences of Philadelphia.

In several cases we feel that the association of species made by Rehn and Hebard must be altered. Though the stridulating field of the male tegmina in *semialata* and *insaroides* is less produced and more broadly rounded than in *gracilipes* and its close allies, we believe that these species as well as *arachnopyga* must be considered offshoots in different directions from the Gracilipes Group, *semialata* representing the least specialized and *arachnopyga* the most specialized. Originally *semialata* and *insaroides* were placed in the Grallator Group. Moreover, the species of that group, *grallator, phalangium* and *ambulator* should be placed last in the genus, being similarly and distinctively distinguished from all other species of this assemblage. It is true that *phantasma* is the most distinctive species of all and in some respects the most highly specialized, but in other features affinity to the Gracilipes Group is clearly indicated. The species *polingi, brevicauda* and *limifera* are clearly members of the Brevicauda Group, but *mescalero, sellata* and *carita* represent species too heterogeneous to constitute a group or to be placed in any of other groups here mentioned.

Arethaea semialata Rehn and Hebard

1914. *Arethaea semialata* Rehn and Hebard, Trans. Amer. Ent. Soc., xl, p. 154, figs. 34, 45, 55 and 66. [♂, ♀: Garden Spring in Brewster County, Moss Well in Chisos Mountains (type locality), Canyon behind Pulliam Bluff in Chisos Mountains, Livermore Peak in Davis Mountains at 7500 feet, slopes of Pine Mountain in Davis Mountains, Maguire's Ranch in Davis Mountains and Franklin Mountains near El Paso, Texas; Mesilla Valley near Organ Mountains, New Mexico.]

This species has subsequently been found only in the Big Bend region of the Rio Grande in Texas, but it undoubtedly occurs in adjacent Coahuila and Chihuahua.

Arethaea coyotero Hebard

1935. *Arethaea coyotero* Hebard, Trans. Amer. Ent. Soc., lxi, p. 132, pl. 5, fig. 6 and pl. 6, figs. 1 and 2. [♂, ♀: Crestline at 6000 feet, Ash Meadows in Amargosa Desert at 2300 feet and Beatty, Nevada; Prescott (type locality), Granite Peak and Mount Trydal near Prescott to 7300 feet, Senator and Kingman, Arizona.]

The distribution of this species is probably not nearly as extensive as that of many species of the genus, but it may eventually be found east as far as extreme southwestern Utah.

Arethaea gracilipes gracilipes (Thomas)

1870. *E[phippitytha] gracilipes* Thomas, Proc. Acad. Nat. Sci. Phila., 1870, p. 76. [♂, southern Colorado.]

1914. *Arethaea gracilipes gracilipes* Rehn and Hebard (in part), Trans. Amer. Ent. Soc., xl, p. 120, figs. 37, 38, 41, 51 and 62. [♂, ♀: Raton, Las Vegas Hot Springs, Albuquerque, Jemez Hot Springs, Fort Wingate and La Luz, New Mexico; (probably) Pine, Arizona.]

Colorado: Trinidad (recorded by Hebard in 1929).

Oklahoma: Guymon, 3133 feet, VIII, 15, 1921, (J. A. G. Rehn; jumping through ghost-grass), 1♂.

Texas: Occurs only in Pan-Handle.

New Mexico: Clifton House, 6400 feet, VIII, 4, 1921, (J. A. G. Rehn; from grasses and indigo-like plant), 2♂, 2♀ (organs of flight decidedly reduced in females). Tucumcari, 4194 feet, VIII, 14, 1921, (J. A. G. Rehn; in grassland with low rabbit-weed), 1♀. Clovis, 4218 feet, VIII, 22, 1921, (Rehn and Hebard), 1♂. Cameo in Roosevelt County, 4124 feet, VIII, 22, 1921, (M. Hebard; in feathery plants among grasses in sand dunes), 2♂, 3♀. Roswell, 4000 feet, VIII, 23, 1921, (Rehn and Hebard), 1♂. Well Country Camp, north slope of Sandia Mountains, 7000 feet, VIII, 16, 1921, (M. Hebard; occasional in rabbit-weed), 1♂, 4♀ (organs of flight very decidedly reduced in females). Zuni, summer of 1917, (A. Skinner), 1♂.

Also recorded from Tesuque Creek at 7200 feet, mesa north of Rio en Medio at 7000 feet and Rancho del Monte at 7000 feet (north of Santa Fé), by Hebard in 1935.

A series of fourteen males from Bent, New Mexico, taken July 1 to 15, 1927 by O. C. Poling, are atypical, showing divergence toward *gracilipes papago*.

Arethaea gracilipes papago Hebard

1935. *Arethaea gracilipes papago* Hebard, Trans. Amer. Ent. Soc., LXI, p. 135, pl. 5, fig. 7 and pl. 6, figs. 3 to 6. [♂, ♀ : twenty-four localities in Arizona including Growler Valley south of Growler Pass at 1200 feet (type locality); Blythe, California.]

Found in southern Arizona east to Oracle, the Santa Rita and the Patagonia Mountains and west to the Growler Valley, this race is known northwestward as far as Wickenburg and Kingman. We have it also from Nogales, Sonora, recorded in 1932 as *gracilipes gracilipes* but corrected in 1935.

Arethaea gracilipes cerciata new subspecies (Pl. XVIII, figs. 1 and 2.)

1914. *Arethaea gracilipes gracilipes* Rehn and Hebard (in part), Trans. Amer. Ent. Soc., XL, pp. 124, 127, 128 (described) and 130. (The males here discussed.)

In 1914 the then available material of the Gracilipes Group led Rehn and Hebard to believe that a single extremely variable species existed, which was divided into two races, *gracilipes gracilipes* and *gracilipes constricta.*

The much larger series now before us prove that two distinct though closely related species are represented and that *gracilipes* divides into three, *constricta* into two geographic races. This we recently explained when describing the western geographic race *gracilipes papago.*[5]

The less produced caudal margin of the pronotal disk distinguishes this insect from *constricta constricta* (Brunner), to which race closest approach in form of the male cerci is shown, but in *gracilipes cerciata* the cercal apices are even more strongly horizontally flattened and are broader, almost ovate as they taper briefly only in their distal portion.

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[5] Trans. Amer. Ent. Soc., LXI, p. 135, pl. 5, fig. 7 and pl. 6, figs. 3 to 6, (1935).

The meso-caudal specialization of the first abdominal tergite (following the median segment) though individually somewhat variable in contour, in caudal aspect has its margins erect and almost parallel in *gracilipes gracilipes* and *gracilipes cerciata,* diverging ventrad and showing broad convexity in *gracilipes papago;* in lateral aspect it is no wider at its base than distad in *gracilipes gracilipes*, but is broader at its base than distad in *gracilipes cerciata* and *gracilipes papago;* its apex in *gracilipes cerciata* is intermediate between the bulbous of *gracilipes gracilipes* and the rounded of *gracilipes papago.* This specialization in the races of *constricta* is smaller and nearest that of *gracilipes papago* though simpler.

In all of the races of *gracilipes* the tegmina are uniformly colored (except in the anal area) and never show the herringbone pattern usually (but not always) pronounced in the races of *constricta.*

Females of *gracilipes* and *constricta* may be easily separated as to their respective species, but the characters noted for them have little or no value toward proper racial assignment.

Type.—♂; canyon behind Pulliam Bluff, Chisos Mountains, Texas. Elevation 4600 to 5000 feet. September 7, 1912. (Rehn and Hebard). [Hebard Collection, Type no. 1287].

Size as large as the largest specimens of typical *gracilipes* known. Pronotum with margins simple, caudal margin of disk bluntly obtuse angulate produced at slightly more than ninety degrees (in paratype and allotype broadly convex without indication of angulation), its lateral margins weakly convex. First abdominal tergite with meso-caudal specialization in lateral aspect as high as wide, but in caudal aspect decidedly higher than its basal width, its apex full and rounded but not bulbous. Tegmina and wings fully developed, the latter considerably surpassing the apices of the caudal femora. Tegmina with stridulating field small, moderately (for genus, actually quite strongly) produced at apex of stridulating vein. Abdominal tergites with caudal margins simple, showing no trace of crenulation. Supra-anal plate simple, not recessed into the preceding tergite, very slightly longer than broad, its dorsal surface moderately concave, its lateral margins paralled but rounding broadly into the transverse distal margin. Cerci strongly bent inward distad, the apical portion very strongly horizontally flattened, spatulate, its margins convex and convergent only distad to form a much shorter tooth than in the other races of the species.

Subgenital plate moderately produced, lateral margins moderately convergent to the short styliform processes, between which the distal margin is very broadly concave. Cephalic and median femora not compressed distad nor angulate produced disto-dorsad.

Allotype.—♀; Shafter, Texas. September 30, 1928. (E. R. Tinkham). [Hebard Cln.].

Size larger than any female of *gracilipes gracilipes* before us, closely resembling that sex of that race. Very similar to male, but larger with heavier body. Organs of flight likewise fully developed. Supra-anal plate very small, semicircular. Ovipositor as characteristic of the species, but tapering less distad to the consequently more rounded apex than in *gracilipes gracilipes*. Subgenital plate very small, blunt triangular, bicarinate.

The measurements of a paratypic male from Marathon, at 3900 to 4160 feet, taken September 12 and 13, 1912 by Rehn and Hebard, follow those of the type. Length of body ♂ 16. and 14.5 (abdomen shrivelled), ♀ 21.3 (inflated); length of pronotum ♂ 3.8 and 3.8, ♀ 3.9; length of tegmen ♂ 25.8 and 22.8, ♀ 27.7; distance tegmina are surpassed by wings ♂ 9.8 and 10, ♀ 8.5; length of cephalic femur ♂ 9.7 and 8.9, ♀ 8.7; length of caudal femur ♂ 28.4 and 25.3, ♀ 28.; length of ovipositor 4.8 mm.

General coloration light green. Antennae yellowish buff. Males with markings of head and pronotum as here described for *ambulator*, but lines and particularly their purplish portions broader. Female lacking these markings of head and pronotum as here described for *ambulator*, but lines greenish white. Abdominal dorsum in males with mere traces of similar lateral lines, but in female such markings are (and evidently were in life) obsolete; ventral surface of abdomen of type given in notes as "having a medio-longitudinal stripe of sulphur yellow which in drying may disappear". (This has occurred.) Organs of flight (badly discolored in males) immaculate green except that the margins of the anal fields and sutural margins are almost colorless, faintly tinged with brown, the lateral portions of the stridulating fields of the males solidly brown. Limbs green. Occiput, pronotum, dorsum of abdomen (very strongly) and limbs with microscopic purplish dots in female, this indicated but not as strongly in the paratypic male and obsolete except on the pronotal disk cephalad in the male type (in less discolored males more of the very delicate markings would probably be visible).

This is evidently much the scarcest form of *Arethaea* in the Big Bend region, where *semialata* Rehn and Hebard and *arachnopyga* Rehn and Hebard are sometimes abundantly present.

Arethaea constricta comanche new subspecies

(Pl. XVIII, figs. 3 and 4.)

1904. *Arethaea gracilipes* Caudell (not *Ephippitytha gracilipes* Thomas, 1870), Sci. Bull. Brooklyn Inst. Arts and Sci., I, p. 114. [♂, ♀; Esperanza Ranch near Brownsville, Texas.]

1914. *Arethaea gracilipes constricta* Rehn and Hebard (in part not typical *constricta* Brunner, 1878) Trans. Amer. Ent. Soc., XL, p. 130, figs. 39 and 40. [♂, ♀; Calvert (atypic), Kerrville, San Antonio, Victoria, Clip, Beeville, Benavides, Brownsville, Laredo, Carrizo Springs and Uvalde, Texas; Monclova (not Montelovez), Coahuila.]

This is the southern race of a species which we here, under *gracilipes cerciata*, have explained was considered a geographic race of *gracilipes* by Rehn and Hebard in 1914.

The present species is distinguished from *gracilipes* by the more sharply produced, acute, caudal margin of the pronotal disk and in a large percentage of the specimens before us (and particularly among the females) a herring-bone pattern of coloration is developed on the tegmina. In addition the tegmina usually have their anal fields and sutural margins dark brown. In all of the races of *gracilipes* the tegmina never show a trace of herring-bone color pattern and their anal fields and sutural margins are paler, the latter usually colorless, rarely tinged with brown (except faintly so in *gracilipes cerciata*).

The present race may be distinguished from *constricta constricta* by its average larger size; the inbent portion of the male cerci is more slender and tapering and less conspicuously horizontally flattened, and the white line along the sides of the abdomen is bordered ventrad by a dark line which proximad (usually) broadens into a wide suffusion (this rarely occurring in *constricta constricta*). Very definite reduction in length of tegmina and wings is not shown by any of our series of *constricta comanche*, but is a not infrequent occurrence in *constricta constricta* in the northern portions of its range.

Type.—♂; Beeville, Texas. July 28, 1912. (M. Hebard). [Hebard Collection, Type no. 1288].

Size medium small for the genus, averaging slightly larger than in *constricta constricta*. Pronotum with margins simple, caudal margin of disk acute-angulate produced at distinctly less than a rightangle, with apex sharply rounded. First abdominal tergite with specialization not as high as in any of the races of *gracilipes*, but higher than in *constricta constricta;*[6] in lateral aspect with basal width definitely greater than its height, but in caudal aspect higher than broad, with apex rounded. Organs of flight fully developed, but the wings do not reach the apices of the caudal femora (they surpass the apices of the caudal femora in only a few specimens of our series, the majority in which this occurs being females). Abdominal tergites with caudal margins showing very feeble crenulation. Supra-anal plate simple, not recessed into the preceding tergite, slightly shorter than broad, its feebly convex lateral margins not convergent and curving broadly into the transverse distal margin. Cerci more like those of *grallator* (Scudder) than those of the more closely related forms; very strongly bent inward distad, the inbent portion slender, horizontally flattened and tapering so decidedly that its distal half is entirely formed by the straight apical tooth. Subgenital plate much as here described for *gracilipes cerciata,* but more elongate. Limbs and stridulating field of male tegmina much as in that and the related races.

Allotype.—♀; same data as type. [Hebard Cln.].

Very similar to females of *constricta constricta* (the series of that race before us averages smaller with organs of flight proportionately shorter in the majority). Very similar to the males of the present race, but usually with body heavier. Organs of flight as given under that sex. Supra-anal plate slightly longer than wide, lateral margins feebly convex convergent and rounding evenly into the broadly convex apex. Ovipositor as in *constricta constricta.* Subgenital plate very small, very blunt triangular, bicarinate.

♂	Length of body	Length of pronotum	Length of tegmen	Distance tegmina are surpassed by wings	Length of cephalic femur	Length of caudal femur	Length of ovipositor
Beeville. Paratype. .	15.8	4.2	23.7	10.7	10.	32.7	—
Beeville. Type.	15.5	4.3	21.2	9.4	10.	31.2	—
Kerrville.	14.	3.8	20.3	8.8	9.	27.7	—
Sabinal.	14.2	3.8	20.1	9.1	8.8	27.4	—
♀							
Beeville. Paratype. .	17.7	4.3	22.9	8.8	10.	31.3	4.9
Beeville. Allotype. ..	16.4	4.	21.7	9.1	10.4	31.8	4.9
Benavides	14.7	3.9	20.2	8.7	7.9	27.	4.8
Benavides.	13.8	3.9	21.4	8.4	8.7	27.3	4.7

Measurements of twelve specimens of this race were given under "*gracilipes constricta*" by Rehn and Hebard in 1914.

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[6] Some individual variation naturally occurs in this small organ.

General coloration light green; though evidently much discoloration has occurred in drying such fragile material, some specimens were clearly cinnamon buff in general coloration in life. Antennae yellowish buff. Head, pronotal and abdominal markings as here described for *ambulator*, but the purplish is supplanted by brown and the brown portion of the abdominal lateral line proximad apparently usually widens into a broad suffusion. In quite a number of discolored specimens the delicate markings are greatly obscured or lost. Tegmina and wings green (or cinnamon buff), the former with anal fields (and particularly the stridulating area in males on each side, sometimes throughout) and sutural margins usually conspicuously darkened, brown; in addition the majority show weakly to very strongly (apparently due to conditions of local environment as slight individual variation is shown within each series from the same locality, though females average more intensive than males) a herring-bone pattern, the veins toward the sutural margins paling and the intervals between them in some individuals moderately darkened.[7] Limbs green, the femora light purplish brown to near their bases and apices. Prozonal portion of pronotal disk and (sometimes) dorsum of abdomen particularly proximad, with microscopic purplish brown dots.

Though preferring grasses, material has been found in dry sorghum and on Huisache, *Vachellia farnesiana*.

In addition to the series of twenty-six males, fifteen females and one immature individual noted above and previously recorded, of which eight males and seven females bearing the same data as the type are designated paratypes, the following material is before us.

TEXAS: College Station, VI, 17, 1933, (H. J. Reinhard), 1♂ (atypic, cercal tooth slightly stouter than normal). Aransas County, VIII, 6, 1928, (R. H. Beamer), 1♂, [Univ. of Kans.]. Jim Wells County, VII, 24, 1928, (R. H. Beamer), 1♂, [Univ. of Kans.]. Falfurrias, VII, 13, 1935, (H. R. Roberts), 1♂, [A.N.S.P.]. Brooks County, VII, 25, 1928, (L. D. Beamer), 1♂, 2♀, [Univ. of Kans.]. Kendall County, VII, 22, 1928, (L. D. Beamer), 1♂. Kerrville, VI, 17, 1908, (F. C. Pratt; on *Monarda citriodora*), 1♂, [U.S.N.M.]. Kenedy, V, 22, 1908, (E. S. Tucker; at light), 1♂, [U.S.N.M.]. Bexar County, VI, 18 to VII, 28, 1929, (H. B. Parks), 2♂, 2♀, [U.S.N.M.]. Six miles west of Sabinal, X, 31, 1931, (L. Seaton; only one seen in brushy pasture), 1♂, [U.S.N.M.]. Dimmit County, VI, 5, 1934, (in light trap), 1♂, [U.S.N.M.]. Sutton County, VIII, 20, 1928, (J. G. Shaw), 2♀, [U.S.N.M.].

The range of this race reaches north and east to College Station and Calvert, north to Kerrville and Sutton County, and west to the latter, Uvalde and Carrizo Springs. In Mexico it is known from Rodriguez and Monterey, Nuevo Leon,[8] and Monclova, Coahuila.

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[7] Though a herring-bone pattern is usually shown on the tegmina in *constricta constricta*, it is, as a rule, less strongly indicated in that race.

In our series of the northern race, *constricta constricta*, distinct divergence toward *constricta comanche* is shown by the cerci of males from Alvarado and Shovel Mount, Texas. In the eastern portion of the range of *constricta comanche*, moreover, divergence toward *constricta constricta* is indicated, the male from College Station as well as that from Calvert having the cercal tooth stouter than normal for this race and the tegmina without trace of herring-bone pattern but fully caudate.

Arethaea constricta constricta Brunner

(Pl. XVIII, fig. 5; pl. XIX, fig. 1.)

1878. *A[rethaea] constricta* Brunner, Monogr. der Phaneropteriden, p. 236. [♂; Dallas, Texas.]

1914. *Arethaea gracilipes constricta* Rehn and Hebard (in part), Trans. Amer. Ent. Soc., XL, p. 130, fig. 32. [♂, ♀: Niobrara, Nebraska; Clark and Barber Counties and Wichita, Kansas; Dallas, Weatherford and Shovel Mount in Burnet County (atypical), Texas.][9]

We recorded this race from Morris, Butler, Dickinson and Saline Counties, Kansas in 1931, from Riley County and Onaga, Kansas in 1934 and from Howe, Oklahoma in 1931.

In northern Texas *constricta constricta* is now known west to the Pan-Handle. It undoubtedly intergrades with *constricta comanche* here described in central Texas.

Arethaea insaroides Rehn and Hebard

1914. *Arethaea insaroides* Rehn and Hebard, Trans. Amer. Ent. Soc., XL, p. 137, figs. 33, 42, 52 and 63. [♂, ♀; Jimulco, Coahuila.]

The species is known only from the described pair.

Arethaea mescalero new species

(Pl. XVIII, figs. 6 to 8; pl. XIX, fig. 2.)

This is a comparatively large species, uniform light green except for the uniform light brown stridulating field of the male

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[8] Recorded as *Arethaea gracilipes constricta* by Hebard in 1932.

[9] The record from Tonala, Chiapas, Mexico, was based on a dried alcoholic male which is typical of *constricta constricta*. Loaned for re-examination through the kindness of the American Museum of Natural History, it is now possible to state definitely that the specimen was incorrectly labelled as to locality.

tegmina which is decidedly large and broad for the genus and is scarcely produced at the apex of the stridulating vein. Its general appearance is consequently nearest that of the very widely distinct Mexican *Arethaea limifera* Rehn and Hebard.

The margins of the pronotum are simple, but the caudal margins of the abdominal tergites are strikingly nodose. In form the male cerci somewhat resemble those of *A. constricta comanche* here described, but their apices are directed nearly vertically dorsad instead of horizontally inward, the male abdomen is unspecialized and the male subgenital plate is longer and narrower distad.

The species is as yet known only from southeastern New Mexico.

Type.—♂; (probably near Melena), Chaves County, New Mexico. July 8, 1927. (P. A. Readio). [Hebard Collection, Type no. 1289].

Size large for the genus, form elongate and compressed. Fastigium broad proximad, narrowing sharply to the apex, medio-longitudinally impressed; its apex falling short of and briefly separated from apex of facial fastigium. Eyes prominent, oblique, elliptical, less than twice as long as broad. Antennae extremely elongate. Pronotum weakly sellate, its margins simple, caudal margin of disk very broadly and evenly convex, lateral lobes with humeral sinus moderately deep. Tegmina and wings caudate, the latter strongly surpassing the apices of the caudal femora; stridulating field of former decidedly ample and broad for the genus, with margin scarcely produced at apex of stridulating vein. Dorsal surface of abdomen without proximal specialization, distal margins of tergites strikingly though minutely nodose. Supra-anal plate approximately semicircular. Cerci elongate, showing very faint curvature of shaft inward and tapering moderately to apex, which is formed by a stout tooth directed dorsad and inward. Subgenital plate elongate, its lateral margins very broadly concave and weakly convergent to the rather narrow and shallowly rounded-angulate emarginate distal margin, the disto-lateral styliform processes very small. Limbs very elongate and slender; the genicular lobes of the cephalic and median femora bispinose, of the caudal femora unispinose, their dorso-distal extremities truncate and not pinched.

Allotype.—♀; same data as type. [Hebard Cln.].

Similar to male but with body larger and heavier. Organs of flight similarly caudate. Supra-anal plate damaged. Ovipositor moderately elongate for the genus, its margins convex-convergent distad, curvature dorsad showing little angulation, margins and lateral surfaces armed distad with stout short teeth. Subgenital plate very small, bluntly rounded triangular, concave medio-longitudinaly between coarse convex lateral carinae, very minutely emarginate at apex.

The measurements of the type are followed by those of a male paratype from Cameo, New Mexico. Length of body ♂ 17. (abdomen retracted) and 21.8, ♀ 22. (estimated); length of pronotum ♂ 4.7 and 4.7, ♀ 4.7; length of tegmen ♂ 26.7 and 27.3, ♀ 27.9; distance tegmina are surpassed by wings ♂ 10.7 and 11.1, ♀ 9.; length of cephalic femur ♂ 10.7 and 10.7, ♀ 10.3; length of caudal femur ♂ 29.4 and 28.3, ♀ 29.; length of ovipositor 5.8 mm.

Generally immaculate light green. Head with a mere trace of a postocular purplish line. Pronotal disk showing microscopic faintly purplish dots, the lateral portions of its caudal margin very narrowly greenish white, in some specimens with a trace of purplish on the inner margins. Pronotal lateral lobes with convex callosities greenish white. Male tegmina with stridulating field very evenly light buffy brown, with veins toward sutural margin green proximad, or both proximad and distad. Abdomen with merest trace of a paler lateral line and with faintly purplish microscopic dots dorsad. Limbs immaculate, but caudal femora whitish ventroproximad.

Specimens Examined: 7; 6 males and 1 female.

NEW MEXICO: Cameo, Roosevelt County, 4124 feet, VIII, 22, 1921, (J. A. G. Rehn; in feathery plants among grasses in depression between sand dunes, where five males of *A. gracilipes gracilipes* (Thomas) were taken), 1♂, *paratype*. (Probably near Melena), Chaves County, VII, 8, 1927, (P. A. Readio), 1♂, 1♀, *type* and *allotype*, [Hebard Cln.]. Eddy County, VII, 12, 1927, (L. A. Anderson), 4♂, *paratypes*, [Univ. of Kansas].

Arethaea arachnopyga Rehn and Hebard

1914. *Arethaea arachnopyga* Rehn and Hebard, Trans. Amer. Ent. Soc., XL, p. 115, figs. 36, 50, 60 and 61. [♂, ♀: Marathon (type locality), Texas; Monclova (nec Montelovez), Coahuila.]

A large series from the western foothills of the Ord Mountains in Brewster County, Texas has been subsequently received.

Arethaea phantasma Rehn and Hebard

1914. *Arethaea phantasma* Rehn and Hebard, Trans. Amer. Ent. Soc., XL, p. 178, figs. 35, 49, 59 and 71. [♂, ♀; Katharine, San Diego, Benavides (type locality), Ringgold Barracks and Carrizo Springs, Texas.]

We now know that this very remarkable species occurs in south-central Texas north to Wilson County and south to Falfurrias. It has not been found in the Brownville Region or in Mexico.

Arethaea sellata Rehn

1907. *Arethaea sellata* Rehn, Proc. Acad. Nat. Sci. Phila., 1907, p. 61, figs. 13 and 14. [♂; Palmerlee, Arizona.]

1912. *Arethaea sellata* Rehn, Kanses Univ. Sci. Bull., v, p. 306. [♂; Santa Rita Mountains, Arizona.]

1914. *Arethaea carita* Rehn and Hebard (in part, not of Scudder 1902), Trans. Amer. Ent. Soc., XL, p. 161, figs. 46, 56 and 68. [♂; Fort Grant, Palmerlee, Huachuca Mountains, Santa Rita Mountains, Fort Buchanan and Phoenix, Arizona.]

Through a peculiar and unfortunate coincidence in 1914, Rehn and Hebard had before them only males of *sellata* and females of *carita* from southern New Mexico and southeastern Arizona. This resulted in their placing *sellata*, a valid and very distinct species, as a synonym of *carita*, a species previously known only from the unique female type. Both sexes of these species may be readily separated by the key and figures here given.

ARIZONA: Chiricahua Mountains, VI, 17, 1932, (E. D. Ball), 1♂; VI, 20, 1928, (A. A. Nichol), 1♂; VIII, 23, 1932, (E. D. Ball), 1 juv. ♂. Millers Canyon, Huachuca Mountains, VII, 10, 1905, 1♂, [Davis Cln.] Huachuca Mountains, 2♂, [Davis and Hebard Cln.]; VI, 11, 1933, (R. H. Beamer), 1♂, [Univ. of Kansas], VII, 8, 1932, (R. H. Beamer and R. H. Beamer, Jr.), 3♂, 6♀, [Univ. of Kansas and Hebard Cln.]. Patagonia Mountains, VII, 20, 1930, (E. D. Ball), 1♀. Washington Mountains near Nogales, VII, 15, 1920, (J. A. Kusche), 2♂, [Univ. of California and Hebard Cln.]. Santa Rita Mountains, VI, 13, 1932, (E. D. Ball), 1 juv. ♀; VII, 16, 1932, (E. D. Ball), 1♂; VII, 17, 1932, (R. H. Beamer), 1♂, 1♀, [Univ. of Kansas and Hebard Cln.].

The species surely occurs also in the adjacent mountains of Sonora.

Arethaea carita Scudder

1902. *Arethaea carita* Scudder, in Scudder and Cockerell, Proc. Davenport Acad. Sci., IX, p. 52, pl. 4, fig. 5. [♀; Mesilla Park, New Mexico.]

1904. *Arethaea gracilipes* Rehn (not *Ephippitytha gracilipes* Thomas 1870), Proc. Acad. Nat. Sci. Phila., 1904, p. 542. [(alcoholic) ♂ and juv. ♀; Casas Grandes, Chihuahua.]

1904. *Arethaea carita* Rehn, Proc. Acad. Nat. Sci. Phila., 1904, p. 542. [(alcoholic) ♀; Casas Grandes, Chihuahua.]

1914. *Arethaea carita* Rehn and Hebard (in part), Trans. Amer. Ent. Soc., XL, p. 161, fig. 67. [♀: Mesilla Park, New Mexico; Casas Grandes, Chihuahua; Camacho, Zacatecas.]

The incorrect association of the male sex of *sellata* with the female sex of *carita* in 1914 is here explained under that species.

NEW MEXICO: Mesa east of Albuquerque, 5250 to 5500 feet, VIII, 8, 1921, (J. A. G. Rehn; beaten from rabbit-weed), 1 ♂, 1 small juv. ♀. Canyon WNW of Hachita Grande Peak, 5500 to 5800 feet, IX, 27, 1922, (Rehn and Hebard; few in fine grasses), 1 ♂, 3 ♀.

ARIZONA: San Bernardino Ranch in Cochise County, 3900 to 3950 feet, IX, 24, 1922, (Rehn and Hebard), 1 ♂. Perillas Mountains in Cochise County near border, 4500 feet, (M. Hebard; from fine dry grass on hillside), 1 ♀. Douglas, VIII, 31 to X, 15, 1925 to 1931, (Jones and Ball), 4 ♂, 4 ♀. Osborn, 4750 feet, IX, 23, 1922, (M. Hebard; in short grass at base of hill), 1 ♀. Don Luis, 5100 to 5150 feet, IX, 24, 1922, (Rehn and Hebard; in fine grass on limestone hillside among agaves, ocotillo and mimosa), 1 ♂, 1 ♀. Naco, X, 7, 1932, (E. D. Ball), 1 ♀. Santa Catalina Mountains, south base at 2000 to 3000 feet, VIII, 25, 1924, (A. A. Nichol), 1 ♂.

Where the distribution of this species and *sellata* coincides in southeastern Arizona, it is apparently present in the valleys and lower slopes of the mountains, below the locations where *sellata* is usually found.

Arethaea polingi Hebard

1935. *Arethaea polingi* Hebard, Trans. Amer. Ent. Soc., LXI, p. 138, pl. 5, figs. 8 and 9, pl. 6, figs. 8 and 9. [♂, ♀; Prescott (type locality), Truxton and Kingman, Arizona.]

The species is as yet known only from northwestern Arizona.

Arethaea brevicauda (Scudder)

1900. *Dichopetala brevicauda* Scudder, Canadian Ent., XXXII, p. 331. [♀; Cahon Pass, California.]

1914. *Arethaea brevicauda* Rehn and Hebard (in part; all but Crestline, Nevada specimen which represents *coyotero*), Trans. Amer. Ent. Soc., XL, p. 169, figs. 47, 57, 69 and 70. [♂, ♀; Cahon Pass, San Jacinto River in San Jacinto Mountains at 2500 feet, Tighes, San Bernardino County, between San Luis Obispo and San Simeon Bay and Los Angeles County.]

The corrected distribution given in 1914 is extended far eastward and also southward by the following records.

NEVADA: Tule Spring in Clark County, VI, 30, 1921, (O. C. Poling), 1 ♂.

ARIZONA: Boulder Spring near Kingman, (O. C. Poling), 3 ♂.

CALIFORNIA: Five miles south of Palm Springs, VI, 8, 1930, (P. H. Timberlake), 1 ♀, [Univ. of Cal. Coll. of Agr.]. San Jacinto Mountains, VII, 21, 1929, (R. H. Beamer), 1 ♂, [Univ. of Kansas]. Warner's in Laguna

Mountains, VII, 1919, (G. H. Field), 1♀. Campo, VIII, 23, 1931, (E. R. Tinkham), 2♀. Potrero, 2323 feet, IX, 12, 1922, (M. Hebard; beaten from tall but not thick yellow grasses), 1♀. Lockwood, VII, 2, 1935, (R. H. Beamer), 1♂, [Univ. of Kansas]. Mount Tom in Inyo County, VII, 11, 1922, (O. C. Poling), 1♂. Tacoima Wash in Los Angeles County, 1060 feet, VI, 23, 1913, (F. Grinnell, Jr.), 1♂, [A.N.S.P.]. Coalinga, below 500 feet, I, 3, 1907, (J. C. Bradley), 1♂

Arethaea limifera Rehn and Hebard

1914. *Arethaea limifera* Rehn and Hebard, Trans. Amer. Ent. Soc., xl, p. 175, figs. 48 and 58. [♀; near Guadalajara, Jalisco.]

We recorded six additional males in 1932 labelled simply " Mexico ".

Arethaea grallator (Scudder)

1877. *Aegipan grallator* Scudder, Proc. Boston Soc. Nat. Hist., xix, p. 39. [♂, ♀; Dallas, Texas.]

1914. *Arethaea grallator* Rehn and Hebard, Trans. Amer. Ent. Soc., xl, p. 148, figs. 44, 54 and 64. [♂, ♀; Rosenberg, Columbus, Lavaca County and Shovel Mount, Texas (and correcting Dallas record as *gracilipes* by Brunner and Victoria record as *phalangium* by Caudell).]

The distribution of this species is now known to include almost the entire central and western portion of eastern Texas, eastern limits being Dallas, Elkhart and Rosenberg and western limits Denton, Comanche County, San Antonio and Victoria.

Arethaea phalangium Scudder

1877. *Aegipan phalangium* Scudder, Proc. Boston Soc. Nat. Hist., xix, p. 40. [♀, Georgia.]

1914. *Arethaea phalangium* Rehn and Hebard, Trans. Amer. Ent. Soc., xl, p. 141, figs. 43,[10] 53 and 65. [♂, ♀; Augusta and Thomasville, Georgia; Hastings, Gainesville, Sanford, Fort Myers, Biscayne Bay and Homestead, Florida.]

Georgia: Hebardville, V, 15, 1915, (M. Hebard), 1 small juv. Folkston, VIII, 2, 1934, (R. H. Beamer), 2♀, [Univ. of Kansas and Hebard Cln.].

Florida: Hilliard, VIII, 19, 1930, (L. D. Tuthill), 1♀, [Univ. of Kansas]. Newberry, VII, 22, 1924, (F. W. Walker), 1♀, [Hebard Cln.]; VIII, 12, 1925, (T. H. Hubbell; at night on palmetto in Long-Leaf Pine saplings with wire grass and palmetto undergrowth), 1 ♀, [Univ. of Mich.]. Orlando, V, 10, 1924, (T. H. Hubbell; at night by beating scrub on sand dunes), 1 juv. ♂, [Univ. of Mich.]. Miami, III, 16, 1915, (M. Hebard; in wire grass, Saw Palmettoes, Sofkee undergrowth of pine woods, *Pinus caraibea*), 1 extremely small juv. Southside, Miami, III, 3, 1916, (M. Hebard; same as last), 1 extremely small juv. Wakulla Springs, VII, 14, 1934, (P. A. McKinstry), 1 ♀. Marianna, VI, 4, 1924, (T. H. Hubbell; at night in open turkey-oak woods on sandy soil, beaten from oak shoots), 1 juv. ♂, [Univ. of Mich.].

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[10] This is a misleading figure as the specimen from which it was drawn is abnormal. That portion of the stridulating area before the stridulating vein can not be seen while the convexity of the margin at the apex of that vein is stronger and shows more of a tendency toward angulation than is usual. The appearance of this area in a normal specimen is much more like figure 44.

This handsome species is now known north to Augusta, Georgia and west to Thomasville, Georgia and Marianna, Florida.

Arethaea ambulator new species

(Pl. XVIII, figs. 9 to 11; pl. XIX, fig. 3.)

This species, with *grallator* (Scudder) and *phalangium* (Scudder) is distinguished by having the dorso-distal extremity of the cephalic and median femora pinched and acutely produced, the production projecting slightly further than the adjacent spines of the genicular lobes.

It is nearest *phalangium*, differing in the even broader and shallower humeral sinus of the pronotal lateral lobes, the crenulate distal margins of the abdominal tergites, very distinctive male cerci and subgenital plate and the considerably longer and narrower ovipositor, which is very definitely less rounded and more pointed at its apex. Moreover decided reduction of the organs of flight is normal in the species in the northeastern portion of its distribution, a condition not yet known to ever occur in any of the other species of the Phalangium Group.

Type.— ♂ ; McWhorter's Ranch near May Pearl, Ellis County, Texas. May 16, 1934. (F. B. Isely). [Hebard Collection, Type no. 1286].

Size large for the genus; form elongate and compressed, but heavier than in the other species. Head much as in *phalangium*. Fastigium very narrow and acute, deeply and broadly medio-longitudinally sulcate, its apex separated from the very small rounded dorsal apex of the facial fastigium. Eyes prominent, oblique, elongate elliptical, slightly over twice as long as broad. Antennae extremely elongate. Pronotum moderately sellate, its margins simple; caudal margin of disk produced at very slightly less than a right-angle (with apex individually varying from acute to sharply rounded); lateral lobes with humeral sinus very broad and very shallow. Tegmina and wings showing very decided reduction, incapable of sustained flight (this is apparently always the case in this region, but in the only two males from more southwestern localities the tegmina and wings are fully developed, the latter slightly surpassing the apices of the caudal femora). Stridulating field of tegmina longitudinal but appreciably shorter than the comparatively elongate pronotum, with margin at apex of stridulating vein little produced, broadly convex. Distal margins of abdominal tergites strikingly crenulate. Supra-anal plate with lateral margins weakly convergent, first broadly convex, then broadly concave, to the broadly convex apex. Cerci elongate, nearly straight, tapering distad weakly then strongly for a brief distance, with apical portion bent inward at very slightly less than ninety degrees and terminating in a large apical tooth, the inbent portion with area before the tooth having its outer surface prominently swollen (thus quite unlike the structure in the related species). Subgenital plate elongate, acute-angulate emarginate distad at slightly less than ninety degrees, the margins of this emargination convex, then concave to the very small and very short styliform processes. Limbs very elongate and very slender, but appreciably less slender than in the related species; genicular lobes of cephalic and median femora bispinose, of caudal femora unispinose. Caudal femora weakly inflated proximad, but more strongly so than in the related species, this clearly indicating somewhat better saltatorial power.

Allotype.—♀; same data as type but taken May 14, 1932. [Hebard Cln.].

Similar to male but with body larger and heavier and organs of flight somewhat more strongly reduced, the wings not reaching the abdominal apex. Pronotum with caudal margin of disk more strongly produced, acute angulate. Supra-anal plate longer than wide, gradually narrowing to the rounded apex and medio-longitudinally sulcate. Ovipositor longer, narrower and less sharply bent dorsad than in the related species; margins and lateral surfaces armed in distal portion with short stout teeth. Subgenital plate very small, bicarinate, triangular with a very small apical emargination.

Moderate variation is shown in the size of the series before us, the tegminal length ranging from 17. to 20.2 mm. in the males (but 25.7 and 26. in the two western males) and from 11.7 to 14. mm. in the females. The described pair measure as follows: length of body ♂ 20.4, ♀ 21.5; length of pronotum ♂ 5.5, ♀ 6.1; length of tegmen ♂ 18.8, ♀ 11.1; distance tegmina are surpassed by wings ♂ 5., ♀ 3.; length of cephalic femur ♂ 14.3, ♀ 13.7; length of caudal femur ♂ 33.3, ♀ 32.9; length of ovipositor 6.8 mm.

General coloration uniform light green. Antennae greenish buff or clear yellow buff. Head with a fine postocular purplish line margined ventrad with whitish, which is continued on pronotum to first sulcus. Caudal margins of metanotum and pronotal lateral lobes similarly margined, this broader laterad on the former. Abdomen with a narrow buffy line dorso-laterad which is very finely margined with purplish in its cephalic portion; ventral surface with longitudinal lines of light yellow to base of subgenital plate. Tegmina immaculate green except stridulating field in males which is light brown, darkened near the stridulating vein and with lateral marginal veins dark, often purplish; female with base of humeral trunk often purplish. Cephalic and median femora very dull purplish to near apices, caudal femora the same from end of proximal enlarged portion to near apices, ventral surface of enlarged portion whitish, externally margined dorsad with purplish, other portions of limbs light green.

Twenty-two specimens were secured at May Pearl on May 16, 1934, by Isely, who writes as follows: "They apparently live in colonies, hidden in the thick grass and weeds in the day time, coming out after one works back and forth through the area. A number of those taken were kept alive in an outdoor cage where they would appear only after the grass was pushed about."

Like its relatives, *ambulator* is probably nocturnal and in the northeastern section of its range its alar development indicates that it cannot fly, but climbs and can leap about in the grasses in which it lives. The males found there may be able to accelerate their movements a little by fluttering, but such would be very ineffectual in the females.

One of the most interesting features concerning *ambulator* is the fact that adults are present in goodly numbers as early as the middle of May. The species evidently appears earlier in the season than any of the other known forms of the genus, all of which appear adult later and reach their maximum adult abundance in the Summer or Fall. This may explain why, in a region where much field work has been done (mainly from July to September) not a specimen of *ambulator* had been secured until 1932.

Specimens Examined: 25; 16 males, 8 females and 1 immature individual.

TEXAS: Fifteen miles west of Denton, VI, 3, 1932, (F. B. Isely; on limestone prairie), 2♂, 2♀. May Pearl, V, 14 to VI, 12, 1932 and 1934, (F. B. Isely), 10♂, 6♀, *type, allotype, paratypes*, 1 large juv. ♂. Ellis County, V, 2 and 31, 1932, (F. B. Isely), 2♂, *paratypes*. Nine miles north of Llano, V, 6, 1932, (E. V. Walter; "only one seen, jumps very weakly in spite of its very long legs."), 1♂, [U.S.N.M.]. Mason, V, 6, 1932, (E. V. Walter; in grass along fence, one male and several large immature females seen), 1♂, [U.S.N.M.].

PLATE XVIII

Fig. 1.—*Arethaea gracilipes cerciata* new subspecies. Dorsal view of male cercus. *Paratype*. Marathon, Texas. (X 16.)

Fig. 2.—*Arethaea gracilipes cerciata* new subspecies. Lateral view of ovipositor. *Allotype*. Shafter, Texas. (X 7 1/2.)

Fig. 3.—*Arethaea constricta comanche* new subspecies. Dorsal view of male cercus. *Type*. Beeville, Texas. (Same scale as figure 1.)

Fig. 4.—*Arethaea constricta comanche* new subspecies. Lateral view of ovipositor. *Paratype*. Beeville, Texas. (Same scale as figure 2.)

Fig. 5.—*Arethaea constricta constricta* Brunner. Dorsal view of male cercus. *Topotype*. Dallas, Texas. (Same scale as figure 1.)

Fig. 6.—*Arethaea mescalero* new species. Dorsal view of stridulating field of male tegmina. *Paratype*. Cameo, New Mexico. (X 8 1/4.)

Fig. 7.—*Arethaea mescalero* new species. Dorsal view of male cercus. *Paratype*. Cameo, New Mexico. (Same scale as figure 1.)

Fig. 8.—*Arethaea mescalero* new species. Lateral view of ovipositor. *Allotype*. Chaves County, New Mexico. (Same scale as figure 2.)

Fig. 9.—*Arethaea ambulator* new species. Dorsal view of stridulating field of male tegmina. *Type*. May Pearl, Texas. (Same scale as figure 6.)

Fig. 10.—*Arethaea ambulator* new species. Dorsal view of distal portion of male abdomen and cerci. *Type*. May Pearl, Texas. (Much enlarged.)

Fig. 11.—*Arethaea ambulator* new species. Lateral view of ovipositor. *Allotype*. May Pearl, Texas. (Same scale as figure 2.)

PLATE XIX

(Figures twice natural size.[11])

Fig. 1.—*Arethaea constricta comanche* new subspecies. Lateral view of female. *Paratype*. Beeville, Texas.

Fig. 2.—*Arethaea mescalero* new species. Lateral view of female. *Allotype*. Chaves County, New Mexico.

Fig. 3.—*Arethaea ambulator* new species. Lateral view of female. *Paratype*. May Pearl, Texas.

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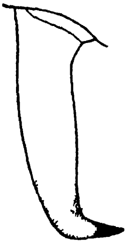
[11] In all of these specimens the antennae are damaged. When entire they extend far beyond the apices of the caudal femora and wings.



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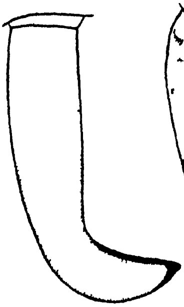

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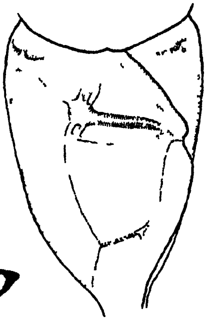

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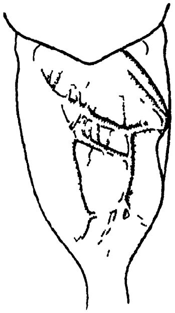

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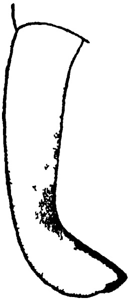

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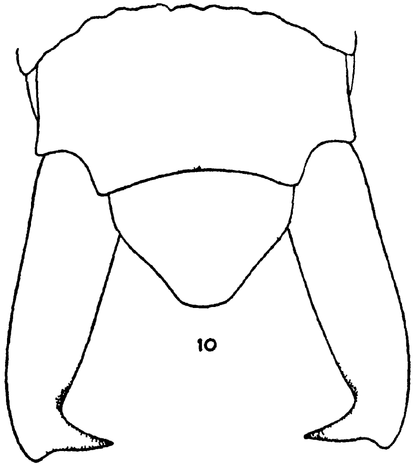

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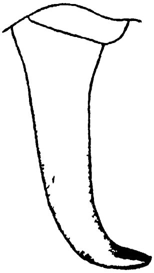

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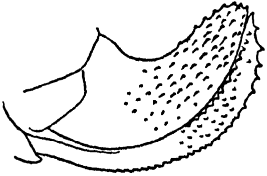

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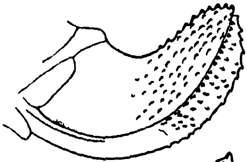

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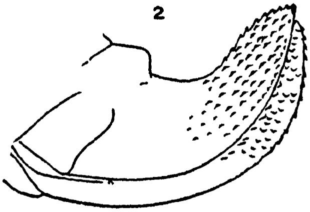

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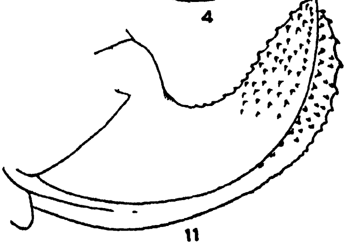

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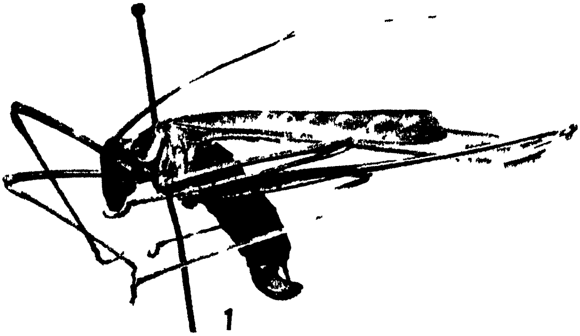
HEBARD—NORTH AMERICAN ORTHOPTERA



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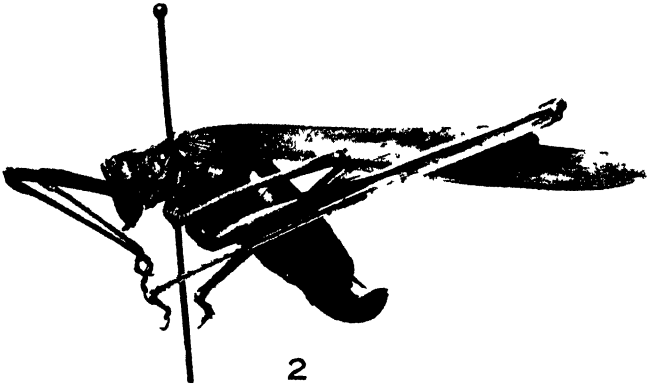

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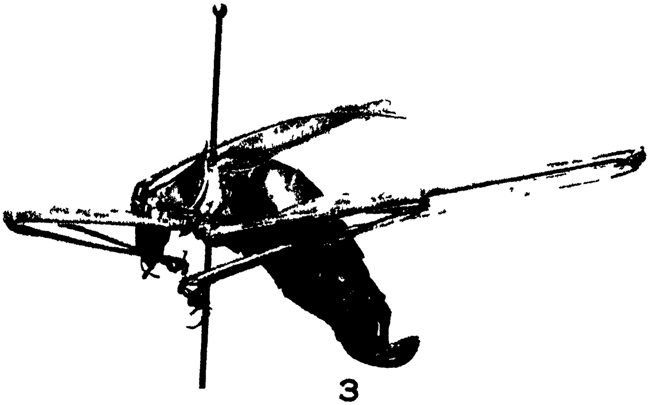

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HEBARD—NORTH AMERICAN ORTHOPTERA

DESCRIPTIONS AND NOTES ON GENERA AND SPECIES OF THE DIPTEROUS FAMILY EPHYDRIDAE. II

BY EZRA T. CRESSON, JR.

This paper is the second in the series of which the first appeared in these Transactions last year under the title "Descriptions of Genera and Species of the Dipterous Family Ephydridae.[1] In that paper I have explained my purpose in publishing this series, but as there will be many notes on synonymy and nomenclature, I have thought it better to change the title as here given.

In 1934[2] I described two new species, *Hydrellia procteri* and *H. advenae*, collected by Mr. William Procter on the water lily, *Nymphea advena* in a pond on Mt. Desert Island, Maine. In searching for additional material of those species, Mr. Procter again visited the type locality and secured some more of these species and also two new ones here described.

Hydrellia procteri Cresson

1834. *Hydrellia proctori* Cresson, Ent. News, XLV, p. 235. (*lapsus calami.*)

This species was originally named for Mr. William Procter whose name was erroneously given as William Proctor.

Hydrellia caliginosa new species

A species very similar to *procteri* but with the tarsi entirely black, not contrastingly pale as in that species. In addition we have a more robust one in the present species with the legs stouter and more strongly bristly.

Black including antennae and tarsi. Palpi and halteres yellow. Wings veins black. Squamae sordid. Face including lunule and cheeks white to ochraceous, not noticeably sericeous. Frons uniformally opaque black but not velvety; the areas not markedly defined except in relief. Mesonotum including humeri and scutellum uniformly subopaque. Pleura gray; metapleura and metanotum dark brown. Abdomen including lateral margins concolorous with mesonotum; ventral lobes grayish. Femora grayish.

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[1] Trans. Am. Ent. Soc., LXI, pp. 345-372, (1935).

[2] Ent. News, XLV, pp. 234-236.

Head distinctly broader than high. Preocellars almost as strong as the proclinate orbital; reclinate orbital well developed; the proclinate one nearly as strong, sometimes represented by two smaller bristles. Arista with six to eight hairs. Face with lower part of orbits strongly flaring, convex in profile with about four facial bristles weaker than the reclinate frontorbitals, two of which are above the line of buccal orbits. Cheeks about as broad as third antennal segment.

Mesonotum sparingly setulose, with four to five pairs in the acrostichal series, the prescutellar pair as strong as the dorsocentrals; the latter arranged, 1 : 1, equally spaced with the median prescutellar. Scutellum flat with apical and lateral bristles strong. Abdomen elongate with tergites II to V subequal in length; V of male acutely triangular. Genital segment not exerted.

Legs slender with bristles and setae weakly developed. Wings with second vein straight, apportioning the second and third costal sections as 35 : 20; third and fourth veins straight; second and third section of fourth as 22 : 30.

Length, 2.4 mm.

Type.—Male; New Mill Pond, Mount Desert Island, Maine. July 25, 1935. (William Procter; on *Nymphaea advena*). [A. N. S. P., no. 6528].

Paratypes.—5 ♂, 3 ♀; with same data, and another collected July 12, 1935.

None of these females has the face white.

Hydrellia suspecta new species

Very similar to *subnitens* Cresson, 1931, the females of the two species offering no distinctive characteristics by which they may be separated. The males however have the exerted genital segment narrow, much longer than broad and contrastingly pale, while in *subnitens* this segment is almost as broad as long and for the most part dark and slightly dusted with gray. Both species have the third antennal segment of the male more or less pale and the extremities of their tibiae pale, concolorous with their tarsi. I cannot find any characters in the small series of these two species at hand by which the females can be separated.

Black; third antennal segment mesally and apically, palpi, extremities of tibiae and all tarsi, concolorous, yellow to orange. Haltere knobs almost white. Genital segment of male yellowish. Wings veins and squamae pale.

Frons opaque black but not velvety; the areas not differentiated. Lunule, face and cheeks, ochraceous with gray reflections. Postbucca and occiput, black, the former, and latter below, grayish. Mesonotum including humeri, notopleura and scutellum, dark, subopaque, slightly overcast with brownish or grayish dust. Pleura and pectus rather densely gray. Abdomen concolorous with mesonotum but the lateral apical angles and the ventral lobes of the tergites, gray. Femora and tibiae also somewhat grayish.

Head broader than high; in profile with the face convex, slightly prominent below. Frons very much broader than long with the reclinate and proclinate orbitals well developed. Face about .25 width of head, twice as long as broad, without any suggestion of a carina; orbits strongly flaring below; parafacialia linear; a series of about six uniform bristles each side, about as strong as the proclinate frontorbitals and about four of the series are above line of buccal orbit. Cheeks less than .5 width of third antennal segment. Arista with six to seven hairs.

Mesonotal setulae sparse but well developed with about six pairs in the acrostichal series. Median prescutellars about as strong as the dorsocentral; Postsutural dorsocentral equidistant between the equally strong antesutural and the median praescutellar. Abdomen of male ovate; tergites II to V subequal in length; V of male narrowly truncated apically. Genital segment of male exerted, flattened much longer than broad.

Legs simple with setulae and bristles rather well developed. Venation normal; second costal section slightly longer than third.

Type.—Male; New Mill Pond, Mount Desert Island, Maine. July 12, 1935. (William Procter; on *Nymphaea advena*). [A. N S. P., no. 6529].

Paratype.—1 ♀; with same data.

Hydrellia williamsi new species

We find in this Hawaiian species many of the characteristics of *Lemnaphila scotlandae* Cresson, 1933; a species also found associated with duckweed, in New York. The structure of the face, however, is entirely different, showing a straight, vertical, not concaved profile, being thus similar to the species of the *formosa*-group; we also find a well developed posterior frontorbital. Otherwise as differing from *formosa* Loew, 1861, and similar to *scotlandae*, we find the antennae spread laterally, folded back against the orbits; acrostichal series almost obsolete and the median prescutellars very much reduced as are also the notopleurals. In its polished lunule and in other respects the present species simulates *Hydrellia tritici* Coquillett, a common Australian species.

♂. Black including antennae and palpi. Halteres pale yellow; coxae, bases of femora, tibiae, particularly the proximal and distal portions and tarsi basally, pale, tawny. Fore tibiae and tarsi darker, to almost black. Wings clear with dark veins.

Frons medianly including ocellar triangle velvety black; orbits dilating above, grayish. Lunule shining. Face niveous, sericeous; this condition extending well along the oral margin, leaving the linear parafacials and orbital portion of the cheeks, black. Pile of third antennal segment black. Mesonotum somewhat shining, at most very sparingly dusted. Scutellum slightly bronzed in contrast. Pleurae opaque but not velvety. Abdomen similar to the mesonotum. Legs with gray vestiture, appearing more sericeous on tibiae.

Head much higher than long; as broad as long. Eyes vertical, micropilose. Frons strongly transverse, about .7 width of head; ocellars well developed, strongly divergent, situated at the sharp vertex; the minute preocellar setae, slightly cephalad of the anterior ocelli, convergent. The posterior orbital strong, caudolaterally inclined; the anterior one weaker, proclinate; an intermediate proclinate micro-seta also present. Facial profile vertical, a strong facial bristle situated low, about aligned with buccal orbit with about three setulae below it. Buccal bristle strong. Antennae situated far above center-line of head and eyes, comparatively large, noticeably deflected laterally and more or less flattened against the head, but with the third segment dependent, about as broad and long, with appreciable pile; arista with seven hairs which extend well beyond apex of the third segment.

Mesonotum almost bare but with a few setulae discernible in the acrostichal series and particularly the median prescutellar pair; one postsutural dorsocentral; the lateral prescutellar very strong; humeral weak; presutural and postalar strong; two weak notopleurals, one marginal mesopleural and a strong sternopleural. Scutellum triangular, rather flat, with rounded apex; apical bristle very strong, suberect and slightly divergent; the lateral bristle almost as strong, situated nearer the base. Abdomen ovate, sparingly setulose; tergite IV the longest; V triangular, almost as long. Genitalia not visible.

Legs slender, sparsely setulose without conspicuous bristles on the flexor margins of femora. Wings elongate; costa normal with a strong bristle just proximad of the end of first vein, its third section slightly longer than second; third section of fourth vein much longer than second; posterior crossvein short, straight perpendicular to fourth vein.

Length, 1.5 mm.

♀. Similar but the legs are darker.

Type.—Male; Kukula Valley, Waianae Mountains, Oahu, Hawaii. February 9, 1936. (F. X. Williams; on duckweed, *Lemna minor*, in covered water trough). [A.N.S.P., no. 6530].

Paratypes.—3 ♂, 2 ♀; same data as type.

This series was received from Mr. Williams of the Experiment Station, Hawaiian Sugar Planters Association, who kindly allowed me to retain the type. A series of the paratypes is retained by Mr. Williams.

The following species, belonging to what may be termed the *geniculata*-group, are recognized by the flattening of the lower portion of the face, which latter, in the species known to me, is uniformally sericeous. These species have in common the following characteristics:

Head slightly broader than high and about .6 as long as high. Frons transverse, depressed above the well-developed lunule. Face about .4 as broad as the head; orbits rather strongly flaring ventrad to moderately broad cheeks; uniformly sericeous, which condition includes the cheeks to the rather sharp cephalic margin of the postbuccal area; foveae and carina obsolete but profile sometimes more or less convex; ventral portion, in profile flattened, strongly retreating; epistoma deeply emarginate; facial series of about six hair-like dorsoclinate bristles, extending well above line of buccal orbits.

Hydrellia conformis Loew

1869. *Hydrellia conformis* Loew, Berl. Ent. Zeit., XIII, p. 41.

The type of this species is a male from Newport, Rhode Island, in the Museum of Comparative Zoology, no. 11152. I have before me two females from Providence, Rhode Island, Sept. 16, [Boston Soc. N. H.], determined by Mr. C. W. Johnson as *conformis*. One of these was compared with the male type when I studied the Loew Collection in 1920, and was considered cospecific. Based on these specimens, this species differs very little from the European *geniculata* Stehhammar, 1844, as known to me by the six specimens I have seen of that species. The study of a more extensive series than I have been able to see of both of these forms may prove them to be one and the same species, or probably *conformis* be given subspecific rank. However, there are some differences which influence me in treating these two, for the present, as distinct species.

As compared with *geniculata*, we find *conformis* has the face golden yellow with less flaring orbits and narrower cheeks; in profile less convex above; the dorsocentral quadrangle transverse.

Third antennal segment dark; apices of fore coxae and extremities of tibiae pale. Wings yellowish with pale veins. Face including lunule and cheeks sericeous golden yellow. Mesonotum and scutellum grayish with slight gloss; humerus, notopleura and pleura, more densely gray.

Orbits moderately flaring ventrad to cheeks, the latter with a width of .16 height of head. Face in profile slightly convex beyond orbits. Arista with about five hairs. Quadrangle of antesutural and postsutural dorsocentrals is transverse. Setae of legs appressed; those of tibiae not appreciably longer than the tibial diameter.

A female labelled, Horse Neck Beach, Massachusetts, Aug. 10, 1906, (Hough), differs from the females above mentioned in having the third antennal segment pale yellow; face niveous, in profile more convex above; cheeks broader; mesonotum more concolorous with the pleura and slightly brown medianly; the dorsocentral quadrangle more equilateral; fore coxae and all tibiae entirely yellow. Structurally this specimen simulates *geniculata*.

Hydrellia bilobifera new species

This species differs from *conformis* in having the tibiae entirely yellow and the sixth tergite in the male with well developed apical marginal lobes, deeply emarginate between.

Face golden yellow, about .4 width of head, strongly flaring ventrad to moderately broad cheeks of about .2 height of head in width. (Antennae missing.) Mesonotum and scutellum almost opaque gray; humerus, notopleura and pleura scarcely more grayish. Bristles of legs not conspicuous but the postflexor cilia of hind femur consists of long hair-like setae. Tibiae entirely yellow. Tergite VI strongly bilobed with the lobes rather elongate and well separated. (Wings missing.)

Type.—Male; Atherton, Missouri. (C. F. Adams). June. [A.N.S.P., no. 6531].

Dr. Adams has kindly allowed me to retain this specimen. It is unfortunate that the antennae and wings are missing.

Hydrellia harti new species

This species differs from *geniculata* in the less convex face with less flaring orbits and narrower cheeks as well as other characters here described.

Face niveous, about .4 width of head; contour of profile evenly convex slightly beyond orbits, the latter not strongly flaring ventrad to narrow cheeks about .16 height of head. Third antennal segment dark; arista with seven hairs. Mesonotum and scutellum opaque, grayish with slight brown tone. Bristles of the legs are more conspicuous than in any of the other species here mentioned, more erect and appearing longer, especially on the tibiae; also the flexor series of femora are of longer bristles. Tibiae dark except their extremities. Tergite VI of the male bilobate apically with broad rounded lobes.

Type.—Male; Havana, Illinois. September 19, 1895. (C. A. Hart). [Illinois Nat. Hist. Survey Colln.].

A female from the same locality and by same collector, Sept. 12, 1895, differs in having but five arista hairs and the dorsocentral quadrangle more equilateral.

Hydrellia hawaiiensis new species

Differing very little from *geniculata,* being most markedly so in its less flaring facial orbits, narrower cheeks, more shining mesonotum, darker wing veins and the bilobate sixth tergite of the male.

♂. Third antennal segment yellow; tibiae yellowish, darker medianly. Wings with dark veins. Face niveous with orbits moderately flaring ventral to cheeks about .16 height of head; facial profile slightly prominent above. Mesonotum subopaque, slightly darker than pleura. Lobes of tergite VI short, broad, and close together. Setae of legs appressed.

♀. Similar but the dorsocentral quadrangle more equilateral.

Type.—Male; Waianae, Oahu, Hawaii. April 19, 1936. (F. X. Williams; on and about green algae. [A.N.S.P., no. 6532]

Paratypes.—3 ♂, 7 ♀; with same data.

This series was received from Mr. Williams of the Experiment Station of the Hawaiian Sugar Planters Association, who kindly allowed me to retain the type for the Academy's collection. A series of both sexes is deposited in the Experiment Station's collection.

This series is the largest I have seen of any species of the group. It shows very little variation, which is noted mostly in the degree of density of the vestiture on the mesonotum, which is sometimes so sparse that the shining surface is very pronounced. The tibiae are sometimes unicolorous except a slight medial darkening; those of the females showing the most contrast in this respect, and have the fore tarsi with only the proximal segment pale. The third antennal segment, especially of the female, is sometimes partly black.

Canace snodgrassii Coquillett

1901. *Canace snodgrassii* Coquillett, Proc. Wash. Acad. Sci., III, p. 378.

This species was established on a number of specimens of both sexes from the Galapagos Islands. These specimens were then or have since become badly mouldy, which condition considerably obscures the structural and vestitural characteristics. However, I have been able to secure, from a study of part of the typical series, the following important characters:

Generally similar to *nasica* Haliday of Europe. Palpi, halteres, squamae and tarsi pale; the pollinose vestiture brownish above becoming grayish below. Mesofrons shining, with the five to six marginal setae rather uniform in size; four frontorbitals present; one strong facial; two strong upcurved buccals of which the lower one is removed to near the oral margin and apparently in series with the facial. Mesonotal setulae rather sparse but well developed; the acrostichals in two distinct series at least antesuturally (The mounting pin generally destroys the postsutural area); dorsocentrals apparently arranged 2 : 2 excluding the prescutellars; two humerals; four scutellars, also discal setae. Fore femora with four to six small spinules on distal half of anterior flexor margin, also a few long post-flexor bristles.

Length, about 3 mm.

Type.—Male; Albermarle Island, Galapagos. January 23, 1899. [U.S.N.M., no. 4430; present selection].

Paratypes.—4 ♂, 5 ♀; with same data. 3 ♂, 2 ♀; Narborough Island, Galapagos, January 13 and 26, 1899.

Canace aldrichi new species

This species differs from *Canacea macateei* Malloch, 1924, by its darker pollinose vestiture and the more numerous spinules on the fore femora.

Palpi, halteres and tarsi except apices, pale yellow; squamae white; wings and veins yellowish. Mesofrons shining; mesonotum supopaque. Pollinose vestiture brownish above, becoming grayish ventrally; that of the face somewhat dull golden.

Structurally similar to *macateei* but the mesonotal setulae are finer, more numerous and the acrostichal series not differentiated, the prescutellar pair, however, are well developed. The anterior flexor margin of fore femora distally with a series of eight to twelve closely set spinules which are about one-third the diameter of the femur in length. (These spinules in *macateei* are only four to six in number, longer and more widely separated.)

Length, 3 to 4 mm.

Type.—Male; Salt Marsh, Palo Alto, California. August 11, 1911. (J. M. Aldrich). [U.S.N.M., no. 51848].

Paratypes.—1 ♂, 2 ♀; with same data. 1 ♀; Redwood City, California, April 25, 1906.

With *snodgrassii* and *macateei,* the present series constitute a group distinguished from the typical one in having the mesofrons (in the American species) shining, its marginal setae more evenly spaced and more uniform in size and inclination; the two upcurved buccals are widely separated, the lower one being close to the oral margin apparently in series with the facial. The fore femora have a series of stout spinules on the distal portion of their anterior flexor margin, the number and size varying in the several species. Should this group prove to warrant recognition, we may use *Canacea* Malloch, 1924, which name was used, apparently unintentionally, with *macateei* when that species was originally described.[3] *Canacea* was there introduced validly, the author stating that "the genus *Canacea* is distinguished from other Ephydridae by the presence of a complete anal cell in the wings." *Canacea macateei* was there described as the only included species. Later in the same year,[4] questioning the validity of the name Canacea or the intent of the author to establish a new genus, I recognized *macateei* as possibly not being congeneric with *Canace nasica* Haliday. Curran in his Manual[5] states that he had learned from Malloch that there was no intent to propose a new genus for *macateei,* Canacea being merely a "slip of the pen." The name, I hold, however, is valid.

In a small collection of Ephydridae received for study from the Director of the Imperial Institute of Entomology I find a new species of the genus *Dryxo*. We now have three known species belonging to this interesting genus: The oriental and little known *Dryxo lispoidea* Robineau-Desvoidy, *D. ornata* (Macquart), a widely distributed African species, ranging from Guinea to Eritrea and south to Cape Colony, and the present new species, known only from Nyasaland.

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[3] Proc. Ent. Soc. Wash., xxvi, p. 52, 1924.

[4] Ent. News, xxxv, p. 164, 1924.

[5] Fam. and Gen. N. Am. Dipt., p. 356, 1934.

Dryxo woodi new species

This species differs from *ornata* Macquart, 1843, most noticeably in the pollinose vestiture being almost entirely whitish, tinged with ochre on upper surfaces; the only mark on the abdomen being a triangular blackish spot at base of the fifth tergite of the male; also differing in other details.

The ground color is almost obscured by the thick deposit of white to ochraceous pollen; however with the third antennal segment, palpi, tormae, apices of tarsi, the spot on fifth tergite of male, the macrochaetae and setulae, black to blackish. The second antennal segment, femora, tibiae, bases of tarsi, halteres and wing veins are yellow; arista, squamae and their cilia, white. Wings hyaline, with a pyriform blackish area in the anal lobe in the male. The dense pollinose vestiture which is almost pure white, becomes quite ochraceous on the frons, mesonotum, scutellum and abdomen of the male.

Structurally similar to *ornata* but more robust. Head not broader than high, but about as long as high; eyes slightly vertical. Frons quadrate, sparingly setulose, with the antennae more widely separated than in *ornata*. Face more swollen and in profile vertical with a weak intra-antennal convexity, devoid of bristles or setulae. Mesonotum with a widely separated pair of bristles (prescutellar acrostichals) near posterior margin. Scutellum slightly broader than long, almost semicircular in outline, with white pile beneath. Abdomen broadly ovate, with second to fourth tergite subequal in length. Mid tibiae with the two proximal extensors closer together than in *ornata;* hind tarsi of male without the long hairs of that species. Wings proportionately broader than in *ornata,* particularly the anal lobe; second section of fourth vein more than twice as long as third.

Length, 8 mm.

Type.—Male; Cholo, Nyasaland, Africa. (R. C. Wood, 704). [British Museum of Natural History Collection].

Paratypes.—1 ♂, 4 ♀; with same data. One male and a female deposited in the collection of the Academy of Natural Sciences of Philadelphia.

In a recent number of Die Tierwelt Mitteleuropas[6] the families Ephydridae and Canaceidae *sic* Canacidae are treated by Dr. Gunther Enderlein on pages 168 to 173. In the Ephydridae are recognized four subfamilies: Clanoneurinae, Notiphilinae, Hydrellinae and Ephydrinae. The former is here proposed for the first time; the genus *Heringium* Enderlein cited as a synonym of *Clanoneurum;* and two new genera are erected. These latter are synonyms and in so stating I am doing it in such manner that there will be no excuse for overlooking them as is often done when buried in a note or discussion. The synonyms of Clanoneurum are also similarly here set forth.

CLANONEURUM Becker

1902. *Cyclocephala* Strobl, Glasn. Zem. Mus. Bosni., ix, p. 42 [507]. (Not Latr., 1825.) (Genotype, *margininervis* n. sp. Monotypic.)

1903. *Clanoneurum* Becker, Mitt. Zool. Mus. Berlin, II, p. 165. (Genotype, *Discomyza cimiciformis* Haliday, 1855. Logotypic by Becker, 1926.)

1904. *Cyclocephala* Strobl, Wissen. Mitt. Bosni., IX, p. 563.

1907. *Cyclocephalomyia* Hendel, Wien. Ent. Zeit., XXVI, p. 98. (New name for *Cyclocephala Strobl,* 1902.)

1909. *Clanoneurum* (Becker) Czerny, Verh. Z. B. Ges. Wien., LIX, p. 266.

1926. *Clanoneurum* (Becker) Becker, Lindner, Fl. Pal. Reg., Ephydr., p. 24.

1926. *Discomyzoides* Becker, Lindner, Fl. Pal. Reg., Ephydr., p. 23. (Genotype, *longicornis* n. sp. Monotypic.) [Syn. by Becker, 1933.]

1933. *Clanoneurum* (Becker) Becker, Deut. Ent. Zeit., 1933, p. 50.

1934. *Heringium* Enderlein, Zool. Anz., CV, p. 192. (Genotype, *ephydrinium* n. sp. Monotypic.) [Syn. by Enderlein, 1936.]

1936. *Clanoneurum* (Becker) Enderlein, Tierw. Mitteleur., XVI, p. 168.

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[6] Band VI, Insekten, Teil 3, Abt. XVI-XVII. Herausg. von P. Brohmann, P. Ehrmann, G. Ulmer. Verlag von Quelle & Meyer in Leipzig. This work is practically synoptical keys to the genera occurring in Central Europe. A study of this author's work in these two families alone, as is shown by my analyses in the present paper, reveals a complete disregard or ignorance of the literature of these families available in most libraries. We are, in consequence, compelled to doubt the authenticity of this supposed great work on the fauna of Central Europe.

The manner of publishing this work is an illustration of the many now current. The number here referred to, is Band VI, Lief. 2. Insekten, Tiel 3, with pages numbered XVI, 1 to XVI, 259; XVII, 1 to XVII, 24. This part also contains the title-page of Band VI, Teil 3, and an "Inhaltsuebersicht." This latter gives a list of the orders treated in band six, each order apparently constituting an "Abt." with separate pagination, that for the Diptera being XVI (part of the pagination above cited). It is evident that these "Abt." must be quoted in bibliographical references to this work, not the "band," "teil" nor "lief." These abteilungs are evidently numbered irrespective of the volumes.

This genus was originally *Cyclocephala* but that name being preoccupied by Latreille in 1825, *Cyclocephalomyia* was substituted by Hendel in 1907. Meanwhile Becker in 1903 erected *Clanoneurum* for *Discomyza cimiciformis* Haliday and a new species from Egypt. These two genera were synonymized by Czerny in 1909, Becker's name having priority. Although Becker, 1926, recognizing *Clanoneurum*, erected *Discomyzoides* for a species from the Caspian Sea region which genus was later (1933) synonymized with *Clanoneurum* by the same author. In 1934 Enderlein erected *Heringium* for a new species found mining the wild European beet, which genus the author later (1936) synonymized with *Clanoneurum*.

Here we have four names proposed for this generic concept, and it is not improbable that the genotypes will prove to be conspecific, and all found to be miners in the plants of the genus *Beta* or allied plants associated with saline and alkaline environments. I am recognizing three of the six species described; the other three are considered synonyms of *cimiciformis*. It seems that the peculiar venation so characteristic of this genus has attracted students whenever one of its species has been encountered among the undetermined material being studied; and the unfamiliarity of these students with the Ephydridae and its literature has resulted in the extensive synonymy here noted.

Clanoneurum cimiciforme (Haliday)

1855. *Discomya cimiciformis* Haliday, Nat. Hist. Rev., II, Proc., p. 124. (Ireland.)

1888. *Discomyza cimiciformis* (Haliday) Girschner, Ent. Nachr., XIV, p. 9, fig. 9.

1902. *Cyclocephala margininervis* Strobl, Glasn. Zem. Mus. Bosni., IX, p. 42, 502. (Dalmatia.) [Syn. by Becker, 1926.]

1903. *Clanoneurum infumatum* Becker, Mitt. Zool. Mus. Berlin, II, p. 165, pl. 6c, fig. 26. (Egype.) [Syn by Cresson, 1925.]

1907. *Clanoneurum cimiciforme* Becker, Zeit. Syst. Hym. u. Dipt., VII, p. 400. (Tunis.)

1924. *Clanoneurum cimiciformis* Cresson, Ent. News, XXXV, p. 163. (North America.)

1925. *Clanoneurum cimiciformis* Cresson, Trans. Am. Ent. Soc., LI, p. 243. (Italy: Trieste, United States.)

1926. *Clanoneurum cimiciforme* Becker, Lindner, Fl. Pal. Reg., Ephyd., p. 24. (Atlantic and Mediterranean coasts of Europe and saline spring in Germany.)

1934. *Heringium ephydrininum* Enderlein, Zool. Anz., cv, p. 191, figs. 1-3. (Corsica; mining *Beta maritima.*) [Present syn.]

1935. *Clanoneurum cimiciforme* Enderlein, Tierw. Mitteleur., xvi, p. 168.

This species was described from Ireland and has since been recorded under its described and synonymic names from other localities in the Atlantic and Mediterranean littoral of Europe, and North Africa; also from several saline springs and lakes of Europe and Egypt.

I have seen specimens of this species from Atlantic coast localities of the United States and from a number of interior localities of western United States in the proximity of saline water. On comparing these with specimens I have seen from Europe, I find no differential characters that may not be considered of more than varietal significance.

Our only knowledge of its biology is that the larvae are miners in the wild beet *Beta maritima.* It is reasonable to infer that it is also a miner in other related plants occurring in saline localities.

Clanoneurum longicorne (Becker)

1926. *Discomyziodes longicornis* Becker, Lindner, Fl. Pal. Reg., Ephyd., p. 23. (Transcaspian.)

1933. [*Clanoneurum*] *longicorne* Hendel, Deut. Ent. Zeit., 1933, p. 50.

Certain described characters of this species suggest that it is sufficiently different from *cimiciformis* to treat it, at present, as distinct from that species.

Clanoneurum orientale Hendel

1913. *Clanoneurum orientale* Hendel, Suppl. Ent., II, p. 97, figs. 5-6. (Formosa.)

1933. *Clanon* [*eurum*] *orientale* Hendel, Deut. Ent. Zeit., 1933, p. 49.

In 1925[7] I considered this species a synonym of *cimiciformis*, but Hendel (1933) takes exception to this treatment. I will not discuss the matter until I have the opportunity of comparing specimens.

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[7] Trans. Am. Ent. Soc., LI, p. 243.

PELIGNUS Cresson

1922. *Pelignus* Cresson, Trans. Am. Ent. Soc., LII, p. 254. (Genotype: *Atissa durrenbergensis* Loew, 1864. Autotypic.)
1936. *Atissina* Enderlein, Tierw. Mitteleur., XVI, p. 169. [Genotype: *Atissa durrenbergensis* Loew, 1864. Present designation.]

Atissina was proposed for the reception of *A. durrenbergensis* and a new species, *Atissina orsovana*, without any designation of a genotype. This omission, according to the 1927 emendation of Article 25, International Rules of Zoological Nomenclature, invalidates the name as there proposed. As this ruling is likely to be disputed by students, I have selected *durrenbergensis* as the genotype, thus making it a pure synonym of *Pelignus* in order to remove any possibility of its status being questioned.

Hendel, 1931 [8] considered *Pelignus* a synonym of *Atissiella* Cresson, 1918, but until an exhaustive study of this group of genera is made I prefer to consider the two distinct. These genera belong to a group of which comparatively little is known, and their species are among the most minute in the Ephydridae.

XANTHOCANACE Hendel

1914. *Xanthocanace* Hendel, Suppl. W. Ent., III, p. 98. (Genotype: *Canace ranula* Loew, 1874.) [Autotypic.]
1926. *Dinomyia* Becker, Lindner, Fl. Pal. Reg., Ephydr., p. 107. (Genotype: *Canace ranula* Loew.) [Monotypic.]
1935. *Myioblax* Enderlein, Sitzb. Gesell. Naturf. Freunde Berlin, 1935, p. 235.[9] (Genotype: "*M. ranula* (Loew, 1874)". [Monotypic.]
1936. *Myioblax* Enderlein, Tierw. Mitteleur., XVI, p. 172. (Genotype: ."*M. ranula* (Loew, 1874)." [Monotypic.]

The amazing thing about this synonymy is that all the genera are proposed for the same species. It is inconceivable that students of European diptera should be unaware of that monographic work of Dr. Lindner's "Die Fliegen der Palaearktischen Region" of which eight volumes are at present nearly completed, the part on the Ephydridae appeared in 1926; or of Dr. Hendel's work on the Formosan species in the Supplementa Entomologica.

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[8] Verh. z.-bot. Gesell. Wien, LXXXI, p. 10.

[9] Although it is immaterial, as only a synonym is involved, there is some question as to the actual date of publication of this reference. The part of that publication, Nr. 4-7, in which it appeared, there is given on the last page (282), "Ausgegeben aus 15, November 1935" but it was received at the Academy of Natural Sciences of Philadelphia, Sept. 11, 1936. The Tierwelt Mitteleuropas, Band VI, Teil 3, containing Abt. XVI, bears on the reverse of title page for that Teil, "Copyright 1936" and was received at this Academy Feb. 4, 1936.

THE HISPANIOLAN GENUS POLYANCISTRUS

(ORTHOPTERA, TETTIGONIIDAE, PSEUDOPHYLLINAE)

BY JAMES A. G. REHN

(Plates XX-XXI)

Recently while at the Museum of Comparative Zoology at Cambridge, Massachusetts, I noticed a small series of most interesting abbreviate-winged pseudophyllids of the genus *Polyancistrus,* from the southern peninsula of the Haitian half of the island of Hispaniola. Along with other material of the same genus, these novelties were placed in my hands for study by Mr. Nathan Banks, the Museum's Curator of Entomology, to whose courtesy I am deeply indebted and whose help has made the present paper possible.

With the Cambridge series I have studied the material of the genus belonging to the Academy of Natural Sciences of Philadelphia and to the Hebard Collection, as well as the series in the United States National Museum, making a total representation of seventy-nine specimens of the genus. As a result of this work our knowledge of the systematics of the genus has been greatly increased, and new data made available on the·evolution of Antillean types.

It is evident from the information now before me on *Polyancistrus* that it has gone through marked speciation in Hispaniola, which would indicate relative antiquity, as well as isolation from the other Greater Antilles. As shown on a succeeding page its sole close relative is Cuban, but this represents a quite distinct genus, although approached by a montane species of Hispaniolan *Polyancistrus* here described as new.

The genus *Polyancistrus* of Serville is considered in all contemporary literature to include but a single species (*serrulatus* Palisot de Beauvois) of very striking and distinctive appearance. In that insect the metazonal portion of the pronotum is extended caudad over the tegminal stridulating or anal field in an acutely scutellate process of unusual type. Originally described from

" Saint Domingue ", the genotypic species has been recorded from Cuba by Guérin-Méneville, who stated he had seen a female taken in the interior of the island,[1] although Bolivar,[2] Gundlach [3] and Rehn,[4] in subsequent Cuban faunal studies, were unable to add any other information on Cuban captures. Similarly Brunner von Wattenwyl,[5] on the basis of a specimen so labelled in his collection, included Porto Rico in the distribution of *serrulatus,* to support which record nothing will be found in Gundlach's 1887 study of the Orthoptera of Porto Rico,[6] in more recent contributions or in the quite extensive collections accumulated in that island by various American institutions or insular government agencies. The entire lack of corroborative information on the presence of *serrulatus,* and consequently the genus *Polyancistrus,* in either Cuba or Porto Rico, although much work of comprehensive character has been done in each island in the last forty years, convinces me the Guérin record was only one of the numerous species credited by him to Cuba but which we now know were never taken on that island.[7] I feel equally certain that the " Porto Rico " specimen cited by Brunner was erroneously labelled or a label was erroneously quoted. In both cases the material doubtless came from Hispaniola, to which island as far as definitely known the genus is confined.

In 1846 Fischer de Waldheim erected a genus *Lobodes* [8] for a species then described as *Lobodes rubricornis,* from the island of " Taiti." The plate figures show clearly the insect is a member of Serville's genus *Polyancistrus,* and the locality " Taiti " must refer to Haiti and not Tahiti. By all modern authors *Lobodes rubricornis* has been considered a synonym of *Polyancistrus serrulatus,* which I am convinced is correct.

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[1] In Ramon de la Sagra, Hist. Phys. Polit. et Nat. d'Île de Cuba., Anim. Artic., p. 355, (1857).

[2] Mém. Soc. Zool. France, I, p. 148, (1888).

[3] Contr. Entom. Cuban., II, p. 354, (1890-91).

[4] Second Rep. Cent. Exp. Sta. Rep. Cuba, p. 210, (1909).

[5] Monogr. der Pseudoph., p. 233, (1895).

[6] An. Soc. Españ. Hist. Nat., XVI, (1887).

[7] See Rehn and Hebard, Bull. Amer. Mus. Nat. Hist., LIV, pp. 256, 257, 259-260, (1927), under *Nauphoeta occidentalis, Zetobora emarginata, Schizopelia emarginata* and the genus *Blaberus.* See also Bates, Bull. Mus. Comp. Zool., LXXVIII, no. 2, pp. 68-69, (1935), relative to Guérin's Lepidoptera records.

[8] Bull. Soc. Impér. Nat. Moscou, XIX, p. 479, pl. 13, figs. 2, 2a and 2b.

The sole near relative of *Polyancistrus* is the genus to which Bolivar applied the name *Pseudancistrus,*[9] the latter unfortunately preoccupied by Bleeker's earlier use (1863) of the same for fishes, and replaced with *Polyancistroides* by Rehn in 1901.[10] Bolivar's genus was erected to include a single species, *P. gundlachi,* which is generally distributed but rare in Cuba. It possesses greatly reduced tegmina, a distinctively formed, non-inflated and peculiarly spined pronotum and lacks wings, while it also has characteristic limb structure and spination very different from what we find in the genotype of *Polyancistrus* (i. e. *P. serrulatus*). However, the extreme condition of the latter genus found in *P. abbotti,* here described, has greatly reduced and purely tympaniform tegmina which suggest *Polyancistroides,* although the pronotum is not of the deplanate, non-bullate type seen in the last-mentioned genus, but is instead an extreme development of that so characteristic of *Polyancistrus.* The limbs of *abbotti* also are typical of the latter genus, and do not approach in form those found in *Polyancistroides gundlachi.* Although I know the last mentioned genus solely from Bolivar's description and illustrations, it clearly is generically distinct from *Polyancistrus,* and doubtless represents an extreme development of the same line, while toward it *abbotti* shows an appreciable tendency.

Some extreme " splitters " would separate *abbotti* generically from *serrulatus,* the genotype of *Polyancistrus,* but *darlingtoni,* another new species here described, supplies a very definite link which ties *abbotti* to the more fully alate types with the pronotal metazona less bulbous and more strongly rugulose. Similarly *P. gerulus* and *loripes* would be considered a distinct generic entity by other students, but such splitting would mask rather than make evident the phylogenetic relationship of the species here discussed.

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[9] Viaje al Pacifico, Ins., p. 82 note, pl. 3, figs. 3, 3a and 3b, (1884).

[10] Canad. Entom., XXXIII, p. 272, (1901).

POLYANCISTRUS Serville

1831. *Polyancistrus* Serville, Ann. Sci. Nat., XXII, p. 153.

1846. *Lobodes* Fischer de Waldheim, Bull. Soc. Impér. Nat. Moscou, XIX, p. 479, pl. 13, figs. 2, 2a and 2b. (Based on L. *rubricornis* Fischer de Waldheim.)

GENOTYPE (by monotypy): *Locusta serrulata* Palisot de Beauvois.

The generic description of *Polyancistrus* given by Brunner in his "Monographie der Pseudophylliden"[11] now requires extensive modification and recasting in the light of present knowledge.

Generic Features.—Fully alate to brachypterous. Head subglobose; fastigium acute trigonal, not surpassing antennal scrobes, sulcate; antennae with proximal article strongly spined dorso-distad. Pronotum elongate, metazona produced caudad into an acute lanceolate supra-tympanal scutellation, equal to twice or more the length of prozona, its surface subdeplanate or bulbously inflated: lateral margins of entire dorsum of pronotum dentate to crenate; transverse sulci deeply impressed; lateral lobes vertical, inserted at right angles, in shape subrectangulate. Tegmina variously developed, ranging from functional flight organs, surpassing the apex of the abdomen, to purely stridulating ones, reaching but little, if at all, caudad of pronotal apex; humeral trunk always pronounced, other longitudinal venational elements may or may not be evident; stridulating field of male, which lies beneath pronotum, bordered laterad by a vertical[12] lamellation placed on the anal vein, with its dorsal outline, as seen in lateral aspect, arcuate to nearly straight. Wings developed to approximately the same extent as the tegmina. Male with tenth tergite bearing a medio-longitudinal apparently glandular, impressed sulcation for most of its length; male cerci with recurved spiniform apices. Ovipositor of female moderately falcate, margins entire, apex acute. Prosternum briefly to aciculate bispinose; mesosternal and metasternal lobes acute. angulate produced. Cephalic femora with surface regulose, ventro-cephalic margin strongly spined; ventro-caudal unarmed; cephalic tibiae with dorsal margins lacking definite spines, ventral margins strongly spined, auditory foramina rimate, covering conchae adpressed. Median limbs as cephalic, except that dorso-caudal margins of tibiae are spinose. Caudal femora with ventro-lateral margins strongly spined; caudal tibiae with all margins spined.

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[11] Monog. der Pseudophyll., p. 233, (1895).

[12] That is vertical when the tegmina are closed over the back, or in repose.

Distribution.—The island of Hispaniola (i. e. the Republic of Haiti and the Dominican Republic), Greater Antilles. Vertical distribution, sea level to five thousand or more feet above the same.

Remarks.—Certain features of apparent variation in material of the genus are very largely due to the method of preservation used. Specimens dried from a liquid preservative generally show a definite amount of shrinkage and twisting of the limbs, the cause of which can readily be recognized. There often is, however, a marked amount of alteration of coloration, which being less readily detected can be more troublesome. This type of drying can produce a general deadening of the whole tegminal pattern by rendering the general dark lining of the venation much less evident, and also masking the freshness of the ochraceous areolae. Similarly the antennal coloration may be bleached out or dulled by staining.

Individually there is quite perceptible variation in the exact number and shape of the crenations or dentations, or both, of the lateral margins of the metazonal production. On the other hand those found on the humeral lateral carinae of the pronotum are quite constant in number and character.

Rarity of Material.—The great rarity of material of certain of the species of this genus has compelled me to refrain from the utilization of characters which are not readily evident, or which would require the dissection of or possibly injury to specimens. For this reason, I have made no use of the stridulating area of the tegmina of the male, which when the tegmina are in repose is hidden under the enlarged metazona. In certain of the species, proper examination of this field would require in addition to the relaxation of the specimen, the detachment of the tegmen. This is not desirable with such great rarities, and in consequence I have confined myself to the features more readily observed. The future acquisition of larger series of certain of the forms will permit a complete study of these features, which may furnish further light on the relationship of the species.

Key to the Forms

1. Tegmina and wings distinctly longer than pronotum, never less than one and one-third times the length of the latter. Discoidal field of tegmina in both sexes with normal presence and disposition of longitudinal veins. Pronotum of male with metazonal inflation, while sometimes marked, never very strongly bullate or cystoid. 2

   Tegmina and wings little if at all longer than pronotum. Discoidal field of tegmina in both sexes with normal longitudinal venation greatly modified or obsolete. Pronotum of male with metazonal inflation very strongly bullate or cystoid, or if not so the cephalic femora are strongly inflated. 6

2. Tegmina strongly acute lanceolate, regularly narrowing in distal two-thirds of length. Pronotal disk in both sexes with marginal dentations markedly spiniform and crenato-dentations very sharply cut, the latter never mere crenations or crenulations. Limbs (particularly in male) very robust, cephalic and median femoral surface crenations fewer and deeper. Tenth abdominal tergite of male with paired widely spaced, roundly rectangulate lobations on distal margin. *gerulus* new species

   Tegmina lanceolate, apex well rounded, converging of margins not occupying more than distal half of their length. Pronotal disk in both sexes with marginal dentations lower, blunter, less sharply cut, the metazonal elements sometimes mere crenulations. Limbs variable in length and build but always less robust than in alternative category, cephalic and median femoral surface crenations more numerous and shallower. Tenth abdominal tergite of male variously developed, but never with the paired marginal lobations rectangulate or widely spaced. 3

3. Tenth abdominal tergite of male with the paired marginal lobes relatively small, closely placed and acute- angulate, the narrowly separating emargination[18] leading proximad on the dorsal surface to a nearly circular, shallowly impressed glandular area. Tegmina of male with proximal lamellation bordering the stridulating field lower and marginally less strongly arcuate. 4

   Tenth abdominal tergite of male with the paired marginal lobes rounded, the separating emargination wider and leading proximad on the dorsal surface to a median, relatively narrow and longitudinal glandular area. Tegmina of male with proximal lamellation bordering the stridulating field markedly elevated and marginally strongly arcuate. 5

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[18] Apparently this tergite possesses sufficient flexibility to bring these two lobes together and thus give the impression of an undivided margin to the tergite. Several of the specimens now in hand show the division of the margin only after careful examination, the lobes having been drawn or pushed together. From the evidence of the full series of the genus, this condition is apparently unusual and not the normal conformation of the tergite.

4. Size larger (length of pronotum, ♂, 15-15.3 mm.; ♀, 15-17.2). Form more robust. Pronotum proportionately broader; metazona of male less strongly arcuate as seen in profile. Tegmina more broadly lanceolate; patch of color proximad on discoidal field in male verdegris green. (Northern Haiti and Dominican Republic.)
serrulatus serrulatus (Palisot de Beauvois)

   Size smaller (length of pronotum, ♂, 13-14.2 mm.; ♀, 12). Form more slender. Pronotum proportionately narrower; metazona of male more strongly arcuate as seen in profile. Tegmina more narrowly lanceolate; patch of color proximad on discoidal field in male ochraceous-buff. (Elevated central and north-central Dominican Republic.)
serrulatus oreiotes new subspecies

5. Size larger (caudal femora, ♂, 25.5-31.5 mm.; ♀, 26.5-33.5). Tegmina and wings usually surpassing apices of caudal femora. Tegmina with areolations of discoidal field more numerous, relatively regular and basically quadrate. Caudal femora more elongate. (Lower elevations in southwestern peninsula of Haiti.) .....*atlas atlas* new species

   Size smaller (caudal femora, ♂, 22 mm.; ♀, 22.2-25.8). Tegmina and wings not surpassing apices of caudal femora. Tegmina with areolations of discoidal field fewer, less regular and less generally quadrate. Caudal femora shorter. (Higher elevations in southwestern peninsula of Haiti.) ....*atlas pilanus* new subspecies

6. Cephalic femora markedly, and median and caudal ones distinctly, inflated and crab-like. Tegmina not extending caudad of apex of pronotum. Size very large (length of body, ♂ and ♀, 44 mm.; length of pronotum, 19 (♀) to 19.5 (♂). ....*loripes* new species

   All femora relatively slender (for genus), not distinctly inflated or crab-like. Tegmina to a definite degree extending caudad of apex of pronotum. Size medium to small. 7

7. Size larger (length of pronotum, ♂, 14 mm.; ♀, 11-11.5: length of tegmen, ♂, 12.6; ♀, 12.6-14). Metazona of pronotal disk narrower, surface of same area in both sexes shagreenous. Tegmina in both sexes subequal to pronotum in length, lanceolate, over half of their length of normal form. (Massif de la Hotte, southwestern Haiti.)
darlingtoni new species

   Size smaller (length of pronotum, ♂, 10-11.5 mm.; ♀, 11: length of tegmen, ♂, 6-6.8; ♀, 6.3). Metazona of pronotal disk broader, surface of same area in both sexes much smoother, in male polished. Tegmina in both sexes greatly abbreviate, shorter than pronotum, apex projecting but little caudad of pronotum, tympaniform in male, subtympaniform in female. (Massif de la Selle, southern Haiti.)
abbotti new species

Systematic Treatment

Polyancistrus serrulatus (Palisot de Beauvois)

1805. *Locusta serrulata* Palisot de Beauvois, Insect. Rec. en Afr. et Amér., p. 218, Orth. pl. 7, fig. 2. [♀; "St. Domingue".]

1845. *Polyancistrus serrulatus* Charpentier, Orth. Descr. et Dep., pl. 50. [♀; "S. Domingo."]

1846. *Lobodes rubricornis* Fischer de Waldheim, Bull. Soc. Impér. Natur. Moscou, XIX, p. 479, pl. 13, figs. 2, 2a and 2b. (*Lobodes spinosus* in legend on plate.) [♂; "Insula Taiti" (doubtless a typographical error for Haiti).]

The exact locality from which Palisot's original material came cannot be determined, but it is evident from his introduction that the old French center about Cap Française, in the present Cap Haitien district, was the area in which his investigations were largely made. Thus it is warranted to assume that his type locality is the north coast of Haiti in the general region of Cap Haitien.

The species here considered to represent *serrulatus* agrees fairly well with Palisot's figure, and also with his description. Charpentier's figure and description, above cited, are certainly of this species. His illustration can be matched in all essential features by females from Loma de Molote here reported.

Fischer de Waldheim's *Lobodes rubricornis* clearly represents the present species, as shown by his figures, particularly in the relative length and proportions of the caudal limbs, the general form of the male pronotum, the outline and fundamentals of the venation of the tegmina and the comparative length of the latter and the abdomen. The lack of indication of strongly contrasted pale areas proximad on the tegmina, which are so conspicuous a feature of the male sex of *P. atlas,* and to a lesser degree of *P. serrulatus oreiotes,* further confirms this reference of *rubricornis.*

The present species averages slightly smaller than *P. atlas atlas,* but is equal to or somewhat larger than *P. a. pilanus,* while the features given in the key will distinguish it from both races of that species.

The series before us shows *serrulatus* is divisable into two geographic races, one of which occurs at lower levels in portions of the northern Dominican Republic, and, I assume from the here delimited type locality, extreme northern Haiti. When Palisot's figure is critically compared with individuals of the same sex (i. e. females) of both subspecies of *serrulatus,* it is evident from the size, general build and coloration that the specimen originally figured belonged to the geographical race of the species to which the name *serrulatus* is here restricted. The other subspecies occurs at elevations of 3000 feet or more in at least certain of the mountains of the Dominican Republic. Whether these two races are found under similar conditions at their respective localities, what the exact area of their distributions may be, and what form occurs in the southern part of the Dominical Republic remains to be determined. That the two intergrade is evidenced by material discussed below.

Polyancistrus serrulatus serrulatus (Palisot de Beauvois)
(Pl. XX, figs. 1-3; pl. XXI, fig. 12.)

The typical form when compared with the subspecies *P. s. oreiotes* is seen to be larger, heavier, more robust, with a proportionately broader pronotum and somewhat wider tegmina, the male also having the metazona of the pronotal disk less strongly arcuate when seen in profile, while the patch of color proximad in the discoidal field of the tegmina of the male, in contact with the basal black area, is dull verdegris green instead of buff.[14]

Variation.—The material in hand shows that while the exact details of the areolation of the tegmina in this subspecies vary individually, the general type of the venation and consequent areolation remains essentially the same in all the individuals examined. The discoidal vein always possesses one ramus distad of the median vein, this ramus generally bifurcate and sometimes biramose, in others each subsidiary fork is itself bifurcate. The ulnar vein is virtually straight and all the areolations of the discoidal field are quadrate to rectangulate, in the latter case longitudinal in disposition, except for a few proximad in the discoido-ulnar area never transverse. The contrasting green and black areas proximad on the tegmina of the male are very distinctive and always indicated in that sex.[15] In the female the much more restricted blackish of the anal area and its border is in contact and contrast with a narrower, acutely angulate outlined patch of dull orange-ochraceous. The nebulose darker multi-annulations of the antennae vary appreciably in their depth and emphasis, being subobsolete in some individuals and quite appreciable in others. Distad the antennae becoming progressively darker as a whole with but a few widely spaced pale annuli.

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[14] A single discolored male specimen of *P. s. serrulatus* ("San Domingo") has this area dirty orange-ochraceous, but this individual shows, by the altered coloration of other parts, as well as of the tegmina as a whole, that its color tones have been profoundly affected by some external influence, possibly excessive exposure to cynide fumes.

Measurements (in millimeters)

In size representative individuals from the series before me show the following measurements.

	Length of body (exclusive of ovipositor)	Length of pronotum	Greatest width of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
♂							
" San Domingo "	42.3	15.2	7	32	10	22.2	—
" San Domingo "	40	15.3	6.8	33	9.5	24	—
Sanchez	38	15	6.1	32.6	10	22.5	—
♀							
" San Domingo "	39	15.2	7.4	39.5	11.4	22	22.5
" San Domingo "	46.5	17.2	7.8	40	11.3	26.8	21
Samaná Bay	35.5[16]	15	7	38.4	11.2	26	20.3
Sanchez	37.5	15.7	7.2	40.5	12	27.6	22.2

Distribution.—Unfortunately most of the series of this subspecies now before me lacks exact locality, so it is difficult to define precisely its range. The specimens in question are labelled " San Domingo. M. A. Frazer." We learn from Dr. Alexander Wetmore's important work on " The Birds of Haiti and the Dominican Republic ",[17] that M. Abbott Frazer accompanied Mr. Charles B. Cory to the Dominican Republic in 1882 and 1883, and he has given us (p. 16) a digest of the localities at which these two individuals collected. This shows that all of their work was in the vicinity of Puerto Plata, in the Samaná

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[15] See footnote number 14.

[16] Abdomen greatly retracted.

[17] Bull. U. S. Nat. Mus., no. 155, (1931).

Bay area or the valley of the Rio Yuna. From the evidence there given the greater portion of their time in the country was spent at Puerto Plata and Samaná. With this information and that found on the other specimens now before me, it is evident that *P. s. serrulatus* in the Dominican Republic is probably limited to, and is definitely known to occur only, along the north coast, the Samaná Bay area and at least the lower levels of the Rio Yuna valley, passing westward into that of the Rio Yaqui del Notre and continuing along the northern coast of Haiti at least to the Cap Haitien district.

Seasonal Occurrence.—Although an adult taken in February is before me, the immature Sanchez material show the second and third instars preceding maturity occur in late May (22 to 27), while the first preceding the adult was secured June 3 to 6, the first adult June 7 to 12. This would indicate the absence of the mature condition for some time before the second week of June. Whether the species is two brooded, or continues adult from June to the next February is still to be determined.

Remarks.—The intergradation of *P. s. serrulatus* and *P. s. oreiotes* is discussed under the latter form.

Material examined: 17; 6♂, 7♀, 1 immature ♂, 3 immature ♀.

"San Domingo"; (M. A. Frazer); 5♂, 4♀; [M. C. Z.; A.N.S.P. and Hebard Cln.]: 1♀; [U.S.N.M.].

Samaná Bay, Dominican Republic; February, 1923; (W. L. Abbott); 1♀; [A.N.S.P.].

Sanchez, Samaná Bay, Dominican Republic; May 22-27 (immature), June 3-6 (immature), June 7-12 and June 24-July 4, 1915; 1♂, 1♀, 1 immature ♂, 3 immature ♀; [A. M. N. H.].

Polyancistrus serrulatus oreiotes[18] new subspecies

(Plate XX, figs. 4 and 5; pl. XXI, fig. 5.)

This subspecies apparently replaces *P. s. serrulatus* at higher elevations in portions of the Dominican Republic, and is in general appearance a smaller, more slender replica of the same. It can be separated from the typical form by the lesser bulk, trimmer appearance, with definitely narrower pronotum, the metazona of which in the male sex is more strongly arcuate when seen in profile, and also in that sex by the ochraceous-buff instead of dull verdegris green color of the proximal spot in the discoidal field of the tegmina. In the female sex the tegmina are appreciably shorter proportionately than in *P. s. serrulatus.*

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[18] From *ορειώτης, a mountaineer,* in allusion to its habitat.

Type.— ♂ ; Manabao,[19] Dominican Republic, Hispaniola. Elevation, 900 meters. March 29, 1922. (E. Kaempfer). [Academy of Natural Sciences of Philadelphia, Type no. 557].

Size medium, smaller than in *P. s. serrulatus,* and form more slender.

The following features are chiefly comparative with those of the typical form of the species.

Head slightly narrower, greatest width across genae slightly less than, instead of subequal to, the depth from the fastigium to the clypeo-labial suture, as in *P. s. serrulatus.*

Pronotum with form more slender, more compressed, dorsum narrower, the greatest width of latter contained two and one-quarter times, instead of twice, in the greatest length of the same, lateral margins of disk, cephalad of the caudal arcuation to apex, more nearly subparallel; in lateral view the caudal two-thirds of the disk of the metazona is seen to be more strongly arcuato-bullate longitudinally.

Tegmina as in *P. s. serrulatus* but the vicinity of the sub-lamellate anal vein is more appreciably arcuate when seen in profile.

Allotype.— ♀ ; same locality as type. March, 1922. (E. Kaempfer). [Academy of Natural Sciences of Philadelphia].

The following features are those of difference from the same sex of the typical form of the species, and also from the above description of the male of *P. s. oreiotes.*

Pronotum with form similar to but more compressed than in the female of *P. s. serrulatus,* the converging arcuate caudal sections of lateral margins more convexly arcuate and less arcuate-oblique; metazonal section no more elevated in profile than in the typical form. Tegmina hardly surpassing the apices of the caudal femora.

Ovipositor very slightly straighter and less evenly arcuate than in *P. s. serrulatus.*

Color.—General color ranging from as pale as buckthorn brown through dresden brown to as dark as cinnamon-brown; pronotum washed dorsad with tawny to russet, laterad the same, with the face and genae, being much paler, sometimes as light as ochraceous-tawny; tegmina often (in several males) with their base color buff olive, contrasting with the pronotal tone, the venation of the tegmina always pencilled with mummy brown to dresden brown, less evident in the female than in most of the males; proximal (anal) border of discoidal field of the tegmina broadly (♂) or quite narrowly (♀) margined with fuscous black, sometimes subobsolete in female, but always striking and conspicuous in the male sex and sharply contrasted with an adjacent (discoidal) blotch of cream color to yellow ocher, which occupies almost the entire width of the proximal fifth of the discoidal field. Antennae buffy, closely, but rather obscurely, multiannulate with dresden brown to mummy brown, the annulations less evident proximad than elsewhere. Occiput clouded to a greater or lesser degree with fuscous; eyes dresden brown to light brownish olive, mottled to a variable extent with fuscous. Limbs of the general color, spines, and particularly those of the caudal femora, yellowish mesad, at base and apex fuscous. Ovipositor of the general color proximad, becoming mars brown distad.

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[19] As far as I can determine this name applies to the valley of one of the upper tributaries of the Rio Jimenoa, which is one of the main branches of the Rio Yaqui del Norte. Manabao is located about twenty miles due east of Yaqui Peak, and less than that to the north of the Constanza Valley, which is in the southern water shed.

While the present series is too small to generalize, apparently the strength of the occipital infuscation and the depth of the fuscous blotch proximad on the tegmina, are directly correlated with the degree of emphasis of the tegminal venation pencilling. However, in all the males seen the fuscous blotch on the tegmina is striking and conspicuously contrasted with the margining pale area.

With the type and allotype I have before me three males and one female from the type locality, all taken March 22, 1922, by Emil Kaempfer; and one male from Constanza, Dominican Republic, elevation of 3600 feet, taken in June, 1922, by the same collector. All of these specimens are in the Academy collection and all are considered paratypes. In their essential features they show little variation except a tonal color range which is indicated in the males from Manabao alone. This involves the base tone and also the emphasis of the venation pencilling and occipital infuscation. A label on one of the Manabao males states it was taken " at light '.

In addition to the material listed above as representing typical *oreiotes*, I have before me one male and five females which are intermediate between the two subspecies of *serrulatus*. These specimens are, two females from Loma de Molote, Dominican Republic, elevation 300 to 500 feet; February 16 and 21, 1922; (E. Kaempfer; taken at light); [A.N.S.P.]: one female from Moca, Dominican Republic, elevation 200 meters; March, 1922; (E. Kaempfer); [A.N.S.P.], and one male and two females from the same locality (1927 and 1928; (G. Russo); [U.S.N.M.]).

While these specimens have the general form somewhat more slender and the dorsum of the pronotum appreciably narrower than in *s. serrulatus,* they have the longer tegmina of the female of the typical form; in size those from Loma de Molote and one of each sex from Moca are virtually equal to, but the remaining female from Moca is distinctly smaller than the typical subspecies. It is evident the more robust typical condition of the species has a relatively limited altitudinal and possibly areal range, and that true *P. s. oreiotes* will first be met slightly under the three thousand foot (900 meter) level. As noticed above, tendencies toward *oreiotes* are seen to be evident as low as five hundred feet.

Measurements (in millimeters)

On a preceding page, under *P. s. serrulatus,* I have presented a representative series of measurements of typical *serrulatus,* which should be used for comparison with the following.

Typical *P. s. oreiotes*

	Length of body (exclusi of ovipositor)	Length of pronotum	Greatest widt of pronotum	Length of tegmen	Greatest widt of tegmen [20]	Length of caudal femur	Length of ovipositor
♂, Manabao, *type*	37.3	14.2	6.6	33.5	9.2	24	—
♂, Manabao, *paratype* .	34.4	13.2	5.9	26	7.7	22	—
♂, Constanza, *paratype*	34.8	13	6	28	8.2	22.3	—
♀, Manabao, *allotype* .	31	12	6	29.4	8.1	23.5	20.3
Intermediates between *P. s. serrulatus* and *P. s. oreiotes*							
♂, Moca	38	16	6.8	34.6	9.4	—	—
♀, Moca	34	12	6	32.3	9.6	22	19
♀, Loma de Molote ...	38.3	13.9	6.6	39	11.2	25.7	22.6
♀, Loma de Molote ...	41	14.2	6.4	40	11.4	28	22.8

Specimens examined: 13; 5♂, 8♀.

Typical. Manabao, Dominican Republic, 900 meters; March and March 22 and 29, 1922; (E. Kaempfer); 4♂ (*type* and *paratypes*), 2♀ (*allotype* and *paratype*); [A.N.S.P.]. Constanza, Dominican Republic, 3600 feet; June 1922; (E. Kaempfer); 1♀ (*paratype*); [A.N.S.P.].

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[20] In all cases in the present paper the width of the tegmina given is that of the marginal and discoidal fields exclusive of the stridulating or anal.

Intermediate between *P. s. serrulatus* and *P. s. oreiotes*. Loma de Molote, Dominican Republic, 300-500 feet; February 16 and 21, 1922; (E. Kaempfer); 2 ♀; [A.N.S.P.]. Moca, Dominican Republic, 200 meters; March, 1922; (E. Kaempfer); 1 ♀; [A.N.S.P.]: 1927 and 1928; (G. Russo); 1 ♂, 2 ♀; [U.S.N.M.].

Polyancistrus atlas[21] new species

1895. *Polyancistrus serrulatus* Brunner, Monogr. der Pseudophyll., p. 233, pl. 9, fig. 10. (Not *Locusta serrulata* Palisot de Beauvois.) [♂, ♀; "St. Domingo"; "Porto Rico".]

Brunner's understanding of *serrulatus* was in all likelihood drawn from this species. His specific description, aside from the dimensions given, is so brief (one and one-half lines) it is inconclusive. His figure of a female, however, is definitely referable to this species on account of its general appearance and the character of the tegminal venation, while the measurements given of both sexes are further indication of the correctness of this assignment of the material before him. Of the localities cited by Brunner, "St. Domingo" was given as quoted from Serville and Fischer and "Portorico" from material in his collection. The latter, as shown on a preceding page, I consider to have been erroneously labelled, perchance having been an erroneous transcription of Port-au-Prince.

The species can be distinguished from the other members of the genus by the differential features given in the key to the forms. There is, however, but little chance of its confusion with any of them other than *P. serrulatus*. From the latter the tegminal venation, which has a strongly developed and regular series of cross-nervures, breaking up the surface of the discoidal field particularly into roughly quadrate, trapezoidal or pentagonal areolets, the more arched metazona of the male pronotum, more contrasted tegminal coloration and more rounded productions of the penultimate abdominal tergite of the same sex, as well as the average longer limbs, will serve to separate *atlas*.

The species is divisable into two geographic races, which inhabit different areas in the southern half of the Republic of Haiti. How far their respective ranges may extend to the eastward into the Dominican Republic is not known. When compared with the typical form of *atlas* the other subspecies is a smaller, shorter legged type, from higher elevations in the Furcy section of the Massif de la Selle uplift.

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[21] In allusion to its generally large size and a fancied resemblance of the broad, humped pronotum to the burdened shoulders of Atlas.

Polyancistrus atlas atlas typical subspecies (Pl. XXI, figs. 6 and 13.)

The typical form is large and robust, in body bulk one of the most massive of the Pseudancistri, with the tegmina averaging more longitudinal and larger than in *P. a. pilanus*, their tips almost always reaching and generally surpassing the apices of the caudal femora, the limbs as a whole longer, but particularly the caudal femora. In addition the typical form has the metazona of the pronotum on the average broader and with the caudal margins of the same broadly arcuate convergent, and less distinctly straight oblique than in *P. a. pilanus*. However, as discussed below, individual variation is quite marked in this feature.

Type.—♂; Coffee Experiment Station, Fond des Negres,[22] Republic of Haiti, Hispaniola. March to April, 1930. (C. H. Arndt). [Academy of Natural Sciences of Philadelphia, Type no. 5556].

Size large; form robust.

Head with greatest width across genae slightly greater than that across eyes, latter subglobose, and subcircular in outline as seen in lateral aspect, from dorsum the eyes are seen to be slightly flattened and weakly directed cephalad; antennae almost twice as long as the body.

Pronotum with the dorsum as a whole quite deplanate on the prozona and the immediately cephalic section of the metazona, thence caudad, as is strikingly evident in lateral view, the metazonal production is markedly arcuate longitudinally, being sigmoidally elevated dorsad over the anal field of the tegmina; length of prozona eqûal to half that of metazona, median tooth of the cephalic margin of the same strongly developed acuminate and directed dorso-cephalad, width of disk of metazona equal to one and one-fourth times the greatest length of the same: lateral carinae of the prozonal disk each bear two elevated but blunt teeth cephalad of the first transverse sulcus and a similar pair on each carinae between the first and the principal transverse sulcus, the latter obtusely angulate on the disk, while the first sulcus is straight; lateral borders of the pronotal metazona in shape moderately arcuate convergent to the acute apex, the borders themselves with one large and a closely placed series of smaller teeth cephalad, thence crenulato-dentate to the apex;

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[22] Fond des Negres is a narrow depression in the southwestern peninsula, situated about seven miles nearly due south of Miragoâne, and east of the Massif de la Hotte. The central part of the depression has an altitude of about 260 meters (853 feet) according to Woodring, Brown and Burbank.

median carina low but distinctly indicated only on the bullate section of the metazona:[23] lateral lobes of pronotum with the sulci deeply incised as in the other members of the genus.

Tegmina very slightly surpassing the apices of the caudal femora, elongate ovate in outline, greatest width contained about three and one-third times in greatest length; costal and sutural margins regularly arcuate, apex narrowly rounded; marginal field broad, at widest point equal to one-half of the entire tegminal width; humeral trunk slightly flexuous, the elements beginning to diverge at half of the tegminal length, median vein diverging briefly proximad of the middle, ulnar vein in general straight; elevated lamellation bordering the stridulating field laterad strongly arcuate, in length reaching virtually as far distad as the apex of the superincumbent metazonal section of the pronotum; cross-nervures of the tegmina numerous, the discoidal field with these rather regularly disposed, the resultant areolae largely subquadrate to oblong in shape, in the proximal section of the discoido-ulnar area numerous and transversely disposed, rami in marginal field in general oblique and roughly subparallel, proximad less direct than distad, due to the anastomosing tendency of the large number of connecting nervures. Wings when closed extending as far caudad as the tegmina.

Abdomen with tenth tergite (anal segment) as seen from dorsum with distal margin arcuate produced, mesad divided into two parts, the resultant shallow lobations narrowly rounded, dorsal surface with the proximal continuation of the median division of the distal margin narrow and deeply impressed within an ovate shallow glandular area covered with short, adpressed, somewhat matted golden hairs; cerci in length equal to two-thirds of dorsal length of tenth tergite, relatively stout, moderately tapering, the shaft straight proximad and faintly inbowed in distal half, apex bearing a short, spiniform tooth on the internal face; twelfth tergite (supra-anal plate) scutellate, acute, elongate semi-elliptical, not surpassing the cercal apices, immediate apex moderately acute, surface in proximal half moderately inflated with a deeply incised medio-longitudinal sulcus, distal half contrastingly subexcavate within the subcingulate margin; ultimate sternite (subgenital plate) moderately rostrate produced mesad, lateral margins converging, subsigmoid, narrowly lamellato-cingulate, stylar ridges parallel, closely placed, narrow distal margin between same acutely emarginate; styles simple, tapering, straight, apex acute, length slightly less than that of cerci.

Limbs rather elongate, robust; cephalic femora subequal in length to pronotum; impressed areolate pattern of dorsal half of same pronounced; ventro-cephalic margin armed with five to six spaced, proximad smaller, spines; cephalic tibiae subequal to the femora in length: median femora very slightly shorter than the cephalic femora, sculpture of same similarly decided, ventro-cephalic margin with six spaced spines: caudal femora with length equal to three-fourths that of the tegmina, from proximal third tapering distad; ventro-lateral margin with ten spaced spines, reducing in size proximad; caudal tibiae subequal to femora in length, dorsal margins with from ten to eleven spines.

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[23] Occasionally obsolete, i. e. in certain male paratypes.

Allotype.—♀; same data as type. [Academy of Natural Sciences of Philadelphia].

Differing from the description of the male type in the following noteworthy features.

Pronotum with metazona somewhat less strongly arcuate longitudinally;[24] median carina subobsolete.

Tegmina, as in all females of this genus, without a proximal elevated lamellation bordering the anal field; venation as a whole as in male.

Abdomen with tenth tergite (anal segment) having the median section of the distal margin shallowly but distinctly and symmetrically trapezoidal emarginate; cerci simple, tapering, acute, apex slightly incurved, in lateral view as a whole arcuate ventrad; twelfth tergite (supra-anal plate) in general character as in male but sculpture less marked, the distal section less contrasted with proximal, not subexcavate within the margin, the proximal section less definitely elevated or as sharply sulcate: ovipositor approximately equal in length to twice the greatest tegminal width, regularly and moderately arcuate, very gradually narrowing from proximal fourth, apex acute: ultimate sternite (subgenital plate) subcordiform, deeply and acutely divided at apex with two acute spinoso-lobate processes, the length of which is slightly less than that of the proximal undivided portion of the sternite.

Color.—General coloration of head, pronotum, abdomen, sterna, limbs and ovipositor ranging from ochraceous-tawny to auburn or prout's brown; base color of tegmina ranging from tawny-olive to dresden brown. Rarely (two females) is the general color largely fuscous, tegmina as well as body, in a single instance the tegmina and abdomen are quite blackish, the limbs deep chestnut brown. This condition may be an expression of melanism. Head with dorsal surface of fastigium and occiput almost or quite entirely fuscous to blackish fuscous, limited laterad by a line extending caudad from the internal border of the eye; antennae ochraceous-buff to raw sienna, multiannulate more or less definitely with buckthorn brown to dresden brown; eyes ranging from buckthorn brown through chestnut to prout's brown. Pronotal disk with lateral teeth and marginal crenulations of the metazona frequently washed with fuscous. Tegmina with the venation pencilled more or less strongly with dresden brown to mummy brown, the humeral trunk, however, more nearly of the general color; elevated lamellate area laterad of the stridulating field of the male tegmina and adjacent border of the discoidal field broadly dull black, proximad reaching to and broadly in contact with the humeral trunk, the immediate adjacent portion of the discoidal field bordering the black area with a strongly contrasted blotch of light ochraceous-buff, the line of juncture being irregularly sigmoid; tegmina of female with similar analogs, the anal field bordered laterad by a narrow pencilling of dull black, which is slightly larger, but still small, proximad, this may or may not be contrasted with an area of light ochraceous-buff, which, however, is but rarely (allotype and one paratype) as strongly contrasted as in the male, usually distinctly less pronounced, in the melanistic individuals completely lacking. Limbs varying in tonal depth with the general coloration, the femora and tibiae in the very darkest specimens distinctly infuscate distad; femoral and tibial spines black, tipped, or annulate near the tip in others, with dull chestnut. Ovipositor becoming deep chestnut distad.

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[24] This is an average features, very definitely marked in the allotype but hardly differing in some other females. The series of the species shows there is much difference in this feature in the extremes of each sex.

There is a definite correlation of paler general color tone and brilliancy and contrast of pattern. All of the melanistic individuals are females (and all are from Fond des Negres), the extreme condition found in one, strongly approached in another and to a decreasing extent by two others.

Series and Variation.—The series of eighteen adults before me which I refer to *P. a. atlas* vary very greatly in certain respects, and from the basis of a much smaller representation several of these features could mislead the student as to their true value. Of these I consider four males and nine females from Fond des Negres, the type locality, as paratypes. The exact outline of the lateral margins of the metazonal portion of the pronotal disk, when seen from the dorsum, while averaging quite full and arcuate ranges from almost straight, caudad converging lines, with of course the usual marginal crenulato-dentations, to rather full arcuations. These extremes are to be found in both sexes and in the single Fond des Negres series. Also in lateral view, and chiefly in the male sex, the variation in the degree of longitudinal arcuation of the same section is quite noticeable.

The number of spines present on the ventro-lateral margin of the caudal femora varies in the Fond des Negres series alone from as few as eight to as many as twelve in the male, and from eight to eleven in the female.

The length of the ovipositor varies very appreciably in this form, as in those other members of the genus of which any fair-sized series have been seen. The same is true of the relative depth of the valves, and to a lesser degree the character of the arcuation of the same as seen in lateral view.

Measurements (in millimeters)

	Length of body (exclusive of ovipositor)	Length of pronotum	Greatest width of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
♂, Fond des Negres, *paratype*	40.5	15	7	34	10.2	25.5	—
♂, Fond des Negres, *type*	45	17.5	7.5	39.6	11	31.5	—
♂, Daquini	41	15.7	6.3	37.5	12	29	—
♀, Port-au-Prince	32	15.5	7	39	12.3	28.5	24
♀, Fond des Negres, *paratype*	35.5	15	7	36	11.1	26.5	23.3
♀, Fond des Negres, *allotype*	46	16.5	7.5	44	13.5	33.5	26

Distribution.—This subspecies is apparently limited to the area embracing the immediate Port-au-Prince district[25] and those portions of the southern peninsula of Haiti below 4000 feet elevation. Its intergradation with *P. a. pilanus* is discussed under the latter subspecies.

Specimens examined: 22; 6♂, 14♀, 1 immature ♂, 1 immature ♀.

Port-au-Prince; March 30, 1929; 1♀; [A.N.S.P.]: September 19, 1926; (Dr. E. A. Vinson, in hollow tree); 1♀; [U.S.N.M.]. Mountains near Port-au-Prince up to 2000 feet; October 2, 1934; (P. J. Darlington, Jr.); 1♀; [M.C.Z.]. Daquini;[26] (W. M. Mann); 1♂; [M.C.Z.]. Fond des Negres Coffee Experiment Station; (C. H. Arndt); some 1930, some specifically March to April 1930; 5♂, 10♀, *type, allotype* and *paratypes*, 1 immature ♂; 1 immature ♀; [A.N.S.P.]. "Haiti"; July, 1934; 1♀; [U.S.N.M.].

[25] It is quite possible the "Port-au-Prince" specimen here reported, and that from "mountains near Port-au-Prince" may have come from the lower levels of the northern slope of the mountains of the southwestern peninsula only a few miles south of Port-au-Prince, but not in the Cul-de-Sac Plain.

[26] A small place to the south of Port-au-Prince, which latter draws part of its water supply from springs at Daquini.

Polyancistrus atlas pilanus new subspecies (Pl. XXI, fig. 7.)

Differing from *P. a. atlas* in its smaller size, proportionately shorter alar organs, which do not surpass the caudal femoral apices, shorter caudal femora and less regular and less quadrate character of the areolations of the discoidal field of the tegmina. It apparently replaces the typical lower level form of the species in the higher parts of the Massif de la Selle, and possibly that of La Hotte, intergrading at elevations little if any lower than the type locality of *P. r. pilanus* (4700 feet).

Type.— ♂ ; Furcy,[27] west side of Massif de la Selle, Republic of Haiti, Hispaniola. [Museum of Comparative Zoology].

The features given here are those of difference from and comparative with the preceding detailed description of the same sex of *Polyancistrus atlas atlas.*

Size distinctly smaller (body length, 31 mm.); form stocky, tegmina and wings not surpassing the caudal femoral apices, caudal limbs proportionately shorter.

Antennae more than twice as long as body.

Pronotum with width of disk of metazona equal to one and one-half times the greatest length of the same, concavity of the surface of the more cephalic section of same area more decided than in the typical form of the species.

Tegmina not quite reaching the apices of the caudal femora, less elongate ovate in outline, the greatest width of the tegmina not less than a third their length, apex more broadly rounded: humeral trunk medio-longitudinal in the proximal half of the tegmen, in that portion faintly sigmoid, thence distad bending toward the costal side of the apex, the elements then diverging; median vein diverging in the middle of the tegmen; ulnar vein less direct, somewhat arcuate and convex toward the humeral trunk; proximal elevated lamellation bordering the stridulating field as in typical *atlas,* but on account of the shorter tegmina occupying a greater proportion of the total length of the latter; cross-nervures of tegmina less complex, numerous and intricate than in typical *atlas,* the clearly marked areolae fewer, less often subquadrate; marginal field more definitely narrowing proximad by the flatter and less strongly arcuate proximal section of the costal margin, the same field with the anastomosing of the oblique nervures less regular and less clearly cut. Wings, when in repose, briefly failing to reach the tegminal apices.

Abdominal appendages and terminal segments as in *P. a. atlas.*

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[27] The elevation of Furcy is given as 1520 meters (4985 feet) by Woodring, Brown and Burbank, Geology of Haiti, p. 401, (1924).

Cephalic and median femora with but five spines on the ventro-cephalic margins; caudal femora shorter and less graceful than in *P. a. atlas,* tapering evenly but not sigmoidally distad from the proximal fifth, ventro-lateral margin with nine spaced spines.

Allotype.— ♀; same locality as type. (W. M. Mann). [Museum of Comparative Zoology].

Differing from the male type and the same sex of *P. a. atlas* in the following noteworthy features.

Size slightly larger than male, but less than that of the same sex of *P. a. atlas.*

Tegmina very slightly surpassing the apices of the caudal femora,[28] greatest length slightly greater than three times the greatest width of the same; as usual in females of the genus lacking an arcuate lamellation laterad of the stridulating field; venation essentially as in the male sex of the subspecies, the cross-nervures, however, more sharply indicated, the areolae fewer, more longitudinal and less quadrate than in the female of *P. a. atlas.*

Ovipositor in length slightly greater than the caudal femora, and equal to two and one-half times the width of the tegmina, regularly arcuate, saber-like, evenly narrowing, apex acute: ultimate sternite (subgenital plate) with distal emargination broader and more semi-elliptical than in *P. a. atlas.*

Color.—In all respects as in *P. a. atlas.* The single male (type) seen has the contrasted blackish and ochraceous areas proximad on the tegmina of the same shape and character as in the typical form, but the ochraceous is much duller and less evident, in shade being buckthorn brown. Whether this is natural or due to staining or desiccation I am unable to say. The females show in the same position a smaller area of ochraceous than in *P. a. atlas,* and the adjacent blackish fuscous proximad on the tegmina is more extensive and the line of contact between the two colors is more irregular and less definite. As all the typical.specimens of *P. a. pilanus* seen have at some time been immersed in a liquid preservative, certain of the colors have been either dulled or lightened in the fashion generally met when material has been so preserved.

Series and Intergradation.—I have before me, in addition to the type and allotype, a paratypic female bearing the same data as the type, and from the collection of the Museum of Comparative Zoology. This is fully representative of the subspecies, although the pronotum is shorter proportionately than in the other specimens, the metazonal section being less produced. An immature male from the slopes of Morne Tranchant, Massif de la Selle, at 4000-5000 feet, taken in July, 1930 by James Bond, and in the Academy of Natural Sciences of Philadelphia, probably represents this subspecies.

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[28] A paratype female from Furcy has the tegmina bearing the same proportionate development found in the male, i.e. narrowly failing to reach the femoral apices. In consequence at Furcy there is some slight variation in this feature.

In addition to the specimens here considered typical of *P. a. pilanus*, I have before me a male and a female taken at Kenshoff,[29] west side of the Massif de la Selle,[30] a locality about two miles due north of Furcy and at nearly the same elevation (4600 feet), which is intermediate between *P. a. atlas* and *a. pilanus*. A female labelled as from the northeastern foothills of the Massif de la Hotte, elevation 2000 to 4000 feet,[31] similarly exhibits features which indicate the intergradation of these forms. The Kenshoff specimens are smaller than the average of *P. a. atlas* and larger than that of *P. a. pilanus*, while the tegminal areolation is more nearly as in the latter, the rather shorter caudal limbs also approaching *pilanus* more closely. The female from the northeastern foothills of the Massif de la Hotte is in size approximately equal to the average of the sex of *P. a. atlas*, in fact in length its tegmina are nearer the maximum found in that subspecies. While its tegminal venation and areolation suggest elements of both forms, the fewer supernumerary subdividing nervures within the areolae is nearer the condition found in *P. a. pilanus*, although the general disposition of the longitudinal veins and the regularity of those of the marginal field tends toward what is found in *P. a. atlas*. The legs, and particularly the caudal ones, are quite long, as in *P. a. atlas*. The dorsum of the metazona in this specimen is produced attenuate, with the lateral margins nearly straight convergent caudad, very much as in the allotype of *P. a. pilanus*. The measurements of these two intermediates are given below.

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[29] Also written "Kenscoff" and "Kenskoff" on certain maps, and so pronounced locally according to Mr. James Bond, the well-known authority on Haitian birds, who has visited that area.

[30] September 1, 1934; (J. P. Darlington, Jr.); (1♀; [M.C.Z.]: October 4, 1927; (G. N. Wolcott); 1♂; [U.S.N.M.].

[31] October 10-24, 1934; (P. J. Darlington, Jr.); [M.C.Z.].

Measurements (in millimeters)

Typical *P. a. pilanus*

	Length of body (exclusive of ovipositor)	Length of pronotum	Greatest width of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
♂, Furcy, *type*	31	12.6	5.7	23.8	8	22	—
♀, Furcy, *allotype*	35.5	16	6.2	32.7	10.2	25.8	27.2
♀, Furcy, *paratype*	35	12.5	6.1	28.5	9	22.2	23
Intermediate between *P. a. atlas* and *P. a. pilanus*							
♂, Kenshoff	31.2	16	7.1	29.5	10.3	25.6	—
♀, Kenshoff	36.5	15.8	7	35	11.2	27.4	22
♀, Foothills of Massif de la Hotte	37.5	15.9	6.8	44.7	12	30.4	23

Distribution.—Apparently *P. atlas pilanus* of the mountain areas of southwestern Haiti replaces the lower level typical form (*P. a. atlas*) of the same region at a point near the 4500 foot contour. The intergradation of the two subspecies is clearly evident, although this is doubtless influenced and complicated by the broken topography of the whole southwestern peninsula of Haiti. It is quite probable that *P. a. pilanus* is a form indigenous to the zone of mountain forest (present or past), and clearing or opening up this territory may provide opportunities for the spread of the larger lowland form. Intergradation then would be along rather different lines from what would be found if natural controls alone were at work. We know typical *pilanus* only from the Massif de la Selle, although it may occur on the upper Massif de la Hotte as well, and the virtually intermediate individual from the slopes of the latter would point toward its presence at higher levels in that immediate area.

Specimens examined: 7; 2♂, 4♀, 1 immature ♂.

Typical *P. atlas pilanus*. Furcy; 1♂ (*type*), 1♀ (*allotype*); [M.C.Z.]: (W. M. Mann); 1♀ (*paratype*); [A.N.S.P.]. Morne Tranchant, 4000-5000 feet; July, 1930; (James Bond); 1 immature ♂, [A.N.S.P.].

Intermediate between *P. atlas atlas* and *P. atlas pilanus*. Kenshoff, 4000-6000 feet; September 1, 1934; (P. J. Darlington, Jr.); 1 ♀; [M.C.Z.]: October 4, 1927; (G. N. Wolcott); 1 ♂; [U.S.N.M.]. Northeastern foothills of the Massif de la Hotte, 2000-4000 feet; October 10-24, 1934; (P. J. Darlington, Jr.); 1 ♀; [A.N.S.P.].

Polyancistrus gerulus [82] new species
(Pl. XX, figs. 6-9; pl. XXI, figs. 8, 14 and 16.)

This very interesting and distinctive species, and *P. loripes*, here described, occupy a position intermediate between the longer winged *P. serrulatus* and *atlas* and the greatly specialized brachypterous, bulbous pronotumed, entirely montane species also here described (*darlingtoni* and *abbotti*). While *P. loripes* is even more brachypterous than the two latter species, its relationship is clearly with *gerulus*, of which it is a brachypterous montane representative. The two species can at once be distinguished from all their relatives by the general character of their pronota, when seen in both dorsal and lateral aspects, in the shape, curvature and surface texture of this area, by the relatively short, stout and proportionately inflated, crab-like limbs, which are more heavily spined than in the other species, and also by the distinctive shape and sculpture of the male ultimate tergite.

The features which separate *gerulus* from *loripes* are presented in the diagnosis of the latter species.

Type.— ♂; Miragoâne,[83] southwestern peninsula, Republic of Haiti, Hispaniola. July. (Eyerdam). [Museum of Comparative Zoology].

Size smaller than in *P. atlas atlas;* form robust, alar organs fully developed but failing to reach the apex of the abdomen or those of the caudal femora, limbs very robust, for the genus almost crab-like; surface as a whole more rugulose or impresso-punctate, tegmina relatively coriaceous.

Head as in *P. atlas* in proportions, shape and sculpture, but eyes when seen from dorsum less protuberant laterad, more directed cephalad; antennae incomplete.

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[82] *A carrier,* in allusion to its broad pronotum.

[83] Miragoâne is located on the north coast of the southwestern peninsula at about midway in its length. The general character of this species leads one to suspect it was taken at a considerable elevation above Miragoâne, but I have no definite evidence to support this suspicion.

Pronotum with its greatest dorsal length equal to slightly more than four-fifths the tegminal length; disk broad, more distinctly scutellate than in *P. atlas,* greatest width of metazona contained slightly more than twice in the pronotal length and equal to two-thirds that of the metazona; surface of pronotal disk sharply bipartite, as usual in genus but with the distinction very marked, the line of the same being briefly cephalad of half of the discal length and a similar distance caudad of the principal transverse sulcus; seen in profile the medio-cephalic spine is quite strong, erect, arcuately directed dorso-cephalad, thence caudad to the line of surface division the disk is deplanato-excavate, the caudal bullate portion is strongly elevato-arcuate over the stridulating areas of the tegmina, extending caudad of the same a distance approximately equal to one-seventh of the entire pronotal length, very faintly and sigmoidal upcurved at the immediate apex; lateral carinae of the pronotal disk developed as in *P. atlas* but individual teeth much more decided, more sharply defined, higher and more acute, general shape of the lateral borders of the metazonal process, as seen from dorsum, broadly and evenly arcuate, the margins of this area passing from crenulate cephalad to definitely crenato-dentate caudad, the caudal apex briefly spiniform acute; surface of deplanate portion of disk rugoso-punctate, of bullate metazonal production rather deeply etched shagreenous, the latter area with traces of a medio-longitudinal carinula: lateral lobes of pronotum essentially as in *P. atlas.*

Tegmina failing to reach the abdominal apex by a distance approximately equal to the length of the pronotal prozona, relatively narrow, acute lanceolate in outline, greatest width (at proximal third) contained faintly more than three times in the tegminal length; costal margin as a whole moderately arcuate, somewhat flattened mesad; apex acute, the immediate angle very narrowly rounded: humeral trunk weakly sigmoid, median vein on one tegmen diverging slightly proximad of middle, on other at distal fourth; ulnar vein rather weak, sinuate, irregular: marginal field with rami relatively few, oblique, in part at least anastomosing; discoidal field with few and rather weak cross-nervures and in consequence a limited number of areolae, which are quadrate or rectangulate, proximad there is a tangle of short anastomosing, weakly defined nervures; arcuate lamellation laterad of stridulating field low, much less decided than in *P. atlas,* in lateral view (when alar organs are in repose) not sharply cut off from the line of the sutural margin. Wings, when in repose, reach almost to the tegminal apices.

Tenth abdominal tergite (anal segment) with its general conformation as in other species of the genus, the paired marginal lobes moderately divergent when seen from dorsum, in outline rectangulate with immediate angle rounded, margin between lobes rectangulate emarginate, the impressed median sulcation extending proximad from same quite deep, becoming more shallow proximad, of moderate and regular width, not expanded, the margins subparallel, with a scattered covering of short, adpressed golden hairs. Ultimate tergite (supra-anal plate) scutellate, acute semi-elliptical, surface concavo-excavate. Cerci as in *P. atlas*. Ultimate sternite (subgenital plate) similar to but less produced than that found in *P. atlas*, stylar ridges shorter, distal marginal emargination rectangulate; styles simple, moderately acute.

Limbs unusually robust for the genus, proportionately the stoutest found in any *Polyancistrus*: cephalic femora in length subequal to the pronotal metazona, subinflated, dorsal line very appreciably and entirely arcuate when seen in profile, surface sculpture heavily impressed, ventro-cephalic margin with four large and one (proximal) very small spaced teeth; cephalic tibiae subequal to the femora in length, unusually robust, spines of flexor margins stouter than in *P. atlas*: median femora slightly shorter than the cephalic femora, similarly very robust and strongly sculptured, ventro-cephalic margin with four large and one small (proximal) spines: caudal femora slightly shorter than the tegmina, equal to one and one-fourth times the pronotal length, robust, proportionately deep, subsigmoidally narrowing distad, ventro-lateral margin with eight to nine closely placed very stout spines, decreasing in size proximad; caudal tibiae faintly longer than caudal femora, each extensor margin armed with nine very stout spines.

Allotype.—♀: same data as type. [Museum of Comparative Zoology].

Differing from the above description of the male sex in the following noteworthy features.

General appearance similar but legs less noticeably robust.

Pronotum with its greatest dorsal length proportionately less extensive, equal to four-fifths the tegminal length; disk very slightly less expanded than in male sex, the greatest width of metazona contained two and one-third times in the pronotal length and equal to three-fourths that of the metazona; spination and crenato-dentation of the discal margins as in the male, but pronounced spines slightly less strongly developed, general arcuation of lateral margins of metazonal disk lower, straighter and more oblique convergent to apex than in male, the metazonal disk thus less broadly scutellate and as a whole more sharply acute caudad; surface of pronotum and lateral lobes as in male.

Tegmina in essential features as in male; median vein diverging at distal third, ulnar vein as irregular and indirect as in male: as in other females of genus no proximal lamellation is indicated laterad of the stridulating field. Wings as in male.

Tenth abdominal tergite (anal segment) with distal margin arcuate emarginate mesad, this flanked laterad by brief but broad rectangulate lobations of the margin. Cerci simple, tapering, moderately acute at apex, this section slightly but appreciably incurved. Ultimate tergite (supra-anal plate) in outline as in male, surface not completely concavo-excavate, but a medio-proximal section so formed, the remainder subdeplanate.[84] Ovipositor in length equal to two-thirds that of the caudal femora, tapering, arcuate. Ultimate sternite (subgenital plate) with the median emargination acute semi-elliptical, flanking productions acute, subspiniform.

Cephalic femora with their length corresponding to that of the male, but on account of the less extended metazonal portion of the female pronotum longer than the latter, being equal to one and one-fifth times the same, less strongly inflated and dorsal line less strongly arcuate than in male, spination as in latter. Median femora less robust than those of male to the same degree found in the cephalic femora. Caudal femora similar to but slightly more slender than those of male.

Color.—General coloration of male almost entirely blackish fuscous. Head with a postocular bar of tawny olive, followed ventrad along caudal border of genae by a margining of clay color; eyes saccardo's umber; antennae passing from cinnamon-rufous proximad to ochraceous (distal portion lacking); palpi greenish white, ultimate and penultimate articles infuscate and streaked with fuscous. Pronotum of general color obscurely tending toward maroon on prozonal disk, with spines of margins tipped with hay's russet to liver brown. Tegmina obscurely mottled with dull snuff brown. Abdomen and pleura solidly of the general color except that the abdominal sternites are maroon, the distal, however, largely fuscous and but narrowly maroon proximad. Limbs fuscous, obscurely washed with bay to chestnut, particularly along the dorso-proximal section of the caudal femora, ventral surface and carinae of caudal femora and extensor surface of caudal tibiae, and quite strongly the genicular portion of all the tibiae, burnt sienna to sanford's brown, femoral and tibial spines fuscous, often, and particularly on the caudal tibiae, tipped with auburn to burnt sienna.

General coloration of female[85] dull zinc orange to cinnamon-brown, most of the head, the lateral lobes of the pronotum, pleura and limbs paler, the disk of the pronotum somewhat darker with the lateral carinae and margins of the metazona, as well as a pair of nebulose spots at the sharp break in surface contour of the metazonal disk, russet to mars brown. Occiput largely blackish fuscous, but with paired postantennal lines of the base color, no postocular lines indicated, palpi of the general color; antennae of the general color very obscurely annulate with darker; eyes as in male. Tegmina dresden brown obscurely mottled with mummy brown. Abdomen cinnamon-brown washed obscurely across each tergite with weak fuscous; ovipositor becoming mars brown distad. Leg spines fuscous, tipped with sanford's brown to auburn.

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[84] This specimen has very certainly been dried from a liquid preservative and the surface sculpture of this tergite may in part be due to subsequent desiccation.

[85] Probably discolored by prior immersion in a liquid preservative.

Measurements (in millimeters)

	Length of body (exclusive of ovipositor)	Length of pronotum	Greatest width of pronotal disk	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
♂, *type*	35	17.3	7.7	22	6.6	20.5	—
♀, *allotype*	35.5	17.6	7.2	25.5	8	21.7	17

The type and allotype are the only specimens known of this very distinctive and well characterized species. The acquisition of additional material is awaited with interest, particularly for the evidence it may furnish on the distribution of the species. We are also in need of further information bearing on the quite different coloration of the two specimens seen.

Polyancistrus loripes[36] new species
(Pl. XX, figs. 10-12; pl. XXI, figs. 15 and 19.)

From its relative *gerulus*, of the north coast of the southwestern peninsula of Haiti, *loripes* can at once be distinguished by its far larger size, its greatly reduced and tympaniform tegmina, which do not surpass the caudal apex of the pronotum, the more narrowly elongate pronotal disk, the less slender and basally more thickened median spine of the cephalic margin of the disk and less pronounced spination of the lateral carinae of the same, and the less marked incrassation of the proximal portion of the caudal femora. The genital features are almost identical with those of *P. gerulus*, the most evident difference being that the angles of the processes of the tenth tergite of the male (anal segment) are more completely rectangulate and less rounded apically than in *gerulus*.

Type.— ♂ ; Constanza,[37] Dominican Republic, Hispaniola. (William L. Abbott). [United States National Museum].

Size large; form subcompressed, alar appendages greatly abbreviate, not surpassing pronotal apex; surface of body and limbs as a whole dully polished even on most of the rugulose pronotal disk.

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[36] In allusion to the very stout and club-like limbs.

[37] Constanza is in the Cordillera Central, in the Provincia de la Vega, at an elevation of 3600 feet. Approximate position 18° 53′ N., 70° 45′ W.

Head in general much as in *P. a. atlas* but proportionately slightly larger, eyes appreciably smaller and proximal antennal article with spine distinctly longer than in that species; antennae and palpi incomplete in type.

Pronotum with general features as in *P. a. atlas* but with caudal production of metazona much more strongly arcuate when seen in profile, as in *gerulus*: median spine of cephalic pronotal margin pronounced, erect, form and curvature as in *P. gerulus;* disk of pronotum with metazona twice as long as prozona, narrower than in *gerulus,* the greatest width contained two and two-thirds times in greatest length of disk; lateral margins of the entire disk with dentations as in *gerulus* but slightly less strongly developed, lateral margins of arcuate process of metazona nearly straight convergent to the apex, which is narrow but less produced than in *gerulus;* principal and preceding transverse sulci deeply impressed, much more decided than in either *P. gerulus* or *atlas;* discal surface of process of metazona closely and heavily shagreenous as in *P. gerulus*: lateral lobes of pronotum as in *P. gerulus* but sulcations much more deeply impressed.

Tegmina tympaniform, not surpassing caudal point of pronotum, very largely hidden beneath the metazonal arcuate section, seen in lateral view the tegminal vertical breadth is equal to twice the tegminal length; costal margin moderately arcuate in proximal half, in distal half strongly arcuate to the rounded rectangulate apex, post-tympanal section of sutural margin oblique, slightly arcuate, lateral bordering lamellation moderately developed, in lateral view slightly arcuate, occupying nearly three-fourths of tegminal length: marginal field with its greatest width equal to slightly more than one-third the greatest tegminal width: humeral trunk with its curvature paralleling that of costal margin but less strongly so distad, the vein elements normally developed; ulnar vein weak, much less distinct than humeral trunk, closely paralleling the lamellation; subsidiary venation a closely knit network without definite elements, producing a large number of areolae. Wings not visible.

Abdomen in all features essentially as in *P. gerulus*: tenth tergite (anal segment) with paired angles of distal margin more sharply rectangulate and with their immediate angles less rounded. Sternal armament as in *P. gerulus.*

Limbs as a whole somewhat longer proportionately than in *P. gerulus,* almost equally robust and incrassate, femoral sculpture as sharply indicated but elements proportionately smaller and more numerous. Cephalic femora equal to six-sevenths of entire pronotal length, seen from dorsum as thick as in *P. gerulus,* distal extremity even more appreciably decurved, ventro-cephalic margin with five large spaced dentiform spines; cephalic tibiae with ventro-cephalic margin having nine, ventro-caudal with seven to nine spines: median femora four-fifths as long as pronotal disk, armed on ventro-cephalic margin with five spines; median tibiae on ventro-cephalic margin with eight, ventro-caudal with six to seven spines: caudal femora with length nearly equal to one and one-third times the length of the pronotal disk, proportionately more slender proximad than in *P. gerulus* and more evenly narrowing distad, the dorsal and ventral lines nearly straight convergent distad, ventro-lateral margin with seven to nine strong, moderately recurved dentiform spines; caudal tibiae slightly longer than the femora, as in *gerulus* markedly quadrate in transverse section, marginal spines very heavy, extensor-external series six in number, extensor-internal nine, flexor-external series eleven, flexor-internal six in number; caudal tarsi damaged.

Allotype.—♀; Jarabacoa,[38] Dominican Republic, Hispaniola. October 10, 1916. (William L. Abbott). [United States National Museum].

The female sex differs from the features given above for the male in the following noteworthy respects.

Pronotum essentially as in male but slightly broader and the arcuation of the metazonal production, when seen in lateral aspect, less marked and lower; disk of pronotum with greatest width contained two and one-fourth times in the greatest length of the same; lateral margins of arcuate process of metazona more arcuately convergent toward apex than in male.[39]

Tegmina when seen in normal repose essentially as those of male in the same position, except that the vertical breadth is slightly less and not quite equal to half the tegminal length, the lateral bordering lamellation of the male tympanum being absent; costal margin as a whole more regularly arcuate; venation as in male except that ulnar is obsolete.

Tenth abdominal tergite (anal segment) with greater (median) portion of distal margin trapezoidally emarginate about the base of the scutellate ultimate tergite (supra-anal plate), which latter is subtrigonal, slightly broader proximad than the median length, converging lateral margins very slightly arcuate, apex rectangulate with a very faint median indentation, dorsal surface trigonally impressed in proximal three-fifths; cerci reaching as far as apex of ultimate tergite, substyliform, tapering except that immediate apex is somewhat abruptly constricted and slightly incurved: ovipositor in length equal to seven-eighths that of caudal femur, in form and curvature an exact replica of that of *P. gerulus*: ultimate sternite (subgenital plate) with distal margin emarginate in the fashion seen in *P. gerulus*.

Limbs somewhat less robust than in male, the femora appreciably less incrassate: cephalic femora with distal extremity less decurved than in male, ventro-cephalic marginal spines but four; remaining limbs as described in male.

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[38] Jarabacoa is on the trail from Santiago and La Vega to Constanza. It is at an elevation of 480 meters (1574 feet) according to Cooke (Geol. Surv. Dom. Rep., Mem. I, p. 34, (1921).).

[39] This may be a purely individual feature. I have reason to believe this is the case, judging from the fluctuations seen in series of other species of the genus. However, I have no definite proof that in the present case it is not sexual.

Color.—General color chestnut, darkening on certain areas to liver brown and lightening to kaiser brown on others. The male is generally dark, the abdomen showing a dull transverse fuscous distal banding of each tergite, the metazona also somewhat darker and more fuscous than the remainder of the pronotum. The female has the face, genae, lateral lobes of the pronotum and portions of the pleura kaiser brown, the occiput, however, largely fuscous as frequently seen in the genus, the limbs as pale as russet, the abdomen barred as in the male. The tegmina in both sexes have a contrasted pattern, the venation of the marginal field being pencilled in ochraceous-buff (♀) to ochraceous-tawny (♂) on a fuscous ground, the discoidal vein and all of the remainder of the normally evident tegmen except for a blotch of zinc orange in the discoidal field, fuscous black, the shape of the zinc orange blotch varying in the two specimens seen but in both being elongate subelliptical, at least twice as long as wide and in length ranging from one-half (♂) to one-third (♀) that of the entire field. Eyes clay color to tawny-olive. Antennae of the general color (♂) to tawny (♀).

Measurements (in millimeters)

	Length of body (exclusive of ovipositor)	Length of pronotum	Greatest width of pronotum	Length of tegmen	Length of caudal femur	Length of ovipositor
♂, Constanza, *type*	44.5	19.3	7.2	9.6	24.2	—
♀, Jarabacoa, *allotype*	43.6	18.3	8	9.7	26	21.7

The type and allotype are the only specimens seen of this most striking species.

Polyancistrus darlingtoni[40] new species

(Pl. XXI, figs. 3, 4, 9, 10 and 17.)

The key alternatives present at a glance the features which separate this and the following species (*abbotti*) from those with more amply developed alar organs and more normal pronota, as well as the distinctive *loripes*, and also those characters which distinguish *darlingtoni* from *abbotti*. The outstanding differential features which single out *darlingtoni* from all its relatives are the greatly reduced but still elementally complete alar appendages, the tegmina subequal to the pronotum in length, the relatively long and narrow pronotum and the definitely shagreenous surface of the inflated metazona of the same.

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[40] In recognition of the energy and perseverance of its collector Mr. P. J. Darlington, Jr., one of the very few naturalists who have reached the summit of the little-known Massif de la Hotte.

Type.—♂; Mount la Hotte, Massif de la Hotte, Republic of Haiti, Hispaniola. Elevation, 5000-7800 feet. October 16-17, 1934. (P. J. Darlington, Jr.). [Museum of Comparative Zoology].

Size rather small (for the genus); form relatively brachypterous, metazonal inflation of pronotum pronounced, bulbous, heavily shagreenous.

Head proportionately broader and shallower than in *atlas*, its greatest width across genae equal to one and one-third times the greatest head depth; occiput more roundly globose than in *atlas*, arcuately declivent to the fastigial base, the fastigium of the type characteristic of the genus but with its axis definitely horizontal and forming a rounded obtuse-angulation with the occipital surface; maxillary palpi shorter, and in consequence proportionately stouter, than in *atlas*; eyes as in *atlas*; antennae equal to about twice the length of the body, proximal article with spine more elongate, aciculate and arcuate than in *atlas*.

Pronotum more strongly sellate than in *atlas*, the excavato-deplanate portion of the prozonal and metazonal disk and the inflated, bullate section of the metazona sharply and very markedly contrasted, the former area of the general character and proportions seen in *atlas* but the surface more deeply cribroso-rugulose, and immediately cephalad of the principal transverse sulcus with a median low strumosity which is covered with the characteristic sculpture, inflated portion of the metazona in profile very strongly arcuate, its immediate cephalic margin subvertical and differentiated in its more finely shagreenous surface texture, the full inflation transversely as well as longitudinally arcuate, its dorsal surface quite strongly and uniformly shagreenous without trace of a median carina, ventral surface markedly concave; median spine on cephalic margin of disk proportionately very large, aciculate, arcuate reflexed proximad, its distal half straight, directed moderately dorso-caudad; lateral margins of disk developed as in the other species in the character, number and disposition of the spines, but the latter are proportionately sharper and higher than in *atlas* or *serrulatus*, lateral margins of metazonal disk coarsely and irregularly serrato-dentate, essentially as in *atlas*, caudal spinose point of margin produced, aciculate, much more pronounced than in *atlas*; width across prozonal section of disk contained nearly two and one-half times in length of whole disk, principal transverse sulcus deeply and conspicuously impressed on dorsum: lateral lobes of pronotum in general as in *atlas*, but transverse sulci more approximating ventrad, and ventral margin sinuato-obtuse-angulate instead of obscurely sigmoid as in *atlas*.

Tegmina in length nearly equal to pronotal disk, reaching to fourth abdominal tergite, in general form lanceolate, rather blunt distad with the immediate apex narrowly rounded, greatest width (median) contained two and three-fifth times in length of same; costal margin moderately arcuate in proximal half, thence distad virtually straight until it narrowly rounds to apex, sutural margin distad of stridulating field straight until it very briefly and strongly rounds to apex: marginal field narrow, its greatest width but faintly greater than one-third that of tegmen, weakly narrowing proximad and distad, stridulating field with lateral bordering lamellation very low, far less evident than in the fully alate forms and even than in *abbotti,* nearly straight marginally when seen in lateral aspect: accessory nervures of marginal field anastomosing and irregular in proximal half of field, in distal half regularly spaced oblique rami; humeral trunk moderately sigmoid, the arcuation more marked proximad than distad; discoidal field heavily coriaceous in proximal two-fifths; there not clearly veined, distal three-fifths with a sparse, open, areolate venation, in which there is no clearly defined ulnar vein, while the median vein, which diverges at the distal third, is no more evident than the other elements of the framework of the hexagonal or pentagonal areolae. Wings reaching virtually to the tegminal apices when in repose.

Tenth abdominal tergite (anal segment) with its distal margin broadly and briefly arcuate bilobate, with the median emargination moderately deep, slightly sharper than a right angle, the proximad continuing median impression quite deep and sharp, virtually without any basal expansion, its internal surfaces and that of the immediately adjacent sections of the dorsum of the tergite with a rather open covering of lanuginose golden hairs: ultimate tergite (supra-anal plate) in general as in other species, its exact form not clearly ascertainable in the unique male: cerci in general form as in other members of the genus but shorter, stockier, the shaft relatively heavy, the distal third quite sharply bent mesad, apex briefly spiniform acute: ultimate sternite (subgenital plate) shorter than in the fully alate forms, lateral margins nearly straight oblique, narrowly lamellate, stylar production with the style-bearing ribs pronounced on ventral surface, parallel, each separated from the tectate median carina by a relatively deep longitudinal channel, this in length equal to about half the length of the sternite, interstylar section of distal margin moderately acute-angulate emarginate, in lateral view the distal half of the sternite is seen to be concave ventrad; styles short, stout, their length faintly less than the interstylar width, moderately tapering, apices blunt acute. Prosternal spines elongate, aciculate, parallel, inclined ventro-caudad; points of mesosternal and metasternal lobes subspiniform.

Limbs similar to those of the fully alate species but more slender, caudal femora shorter: cephalic femora faintly shorter than the dorsum of the pronotum, distal extremity less decurved than in *P. atlas,* surface multistrumose, ventro-cephalic margin with five spines; cephalic tibiae slightly longer than femora, dorsal margins unspined or with two to three rudiments of spines: median femora slightly shorter than the cephalic, of similar structure and armament; median tibiae slightly longer than the femora, dorso-cephalic margin unarmed, dorso-caudal with four spaced spines: caudal femora subequal to the length of pronotum and tegmen together, the apices but briefly surpassing the apex of the abdomen, of the type usual in the genus, ventro-lateral margin with eight marginal spines in distal three-fourths; caudal tibiae surpassing the femoral length by one-fifth that of the latter, dorsal margins each with nine spaced spines, ventro-lateral margin with ten to twelve, ventro-internal with eight to nine spines.

Allotype.— ♀ ; Northeast foothills of Mount la Hotte, Massif de la Hotte, Republic of Haiti, Hispaniola. Elevation, 2000-4000 feet. October 10, 1934. (P. J. Darlington, Jr.). [Museum of Comparative Zoology].

Differing from the description of the male in the following noteworthy features.

General form less strongly humped than in the male, the pronotum as a whole of the character which is the norm in the genus.

Pronotum hardly more strongly sellate than in the female of *P. atlas,* the contrast between the deplanate and elevato-arcuate sections of the disk but slightly more marked than in the same sex of *atlas,* and quite different from the marked structural difference seen in the male of *darlingtoni,* the discal passage from one to the other relatively even, surface sculpture of disk as in male but passage from the cribroso-rugulose prozona to the finely shagreenous metazona less sharp, latter in transverse section much flatter than in male and with indications of an irregular and rather low median carina; cephalic margin with median spine as pronounced as in male;[41] width across prozonal section of disk contained twice in the length of whole disk; lateral lobes with ventral margin more nearly straight, but faintly sigmoid.

Tegmina in length equal to one and one-fourth times the dorsal length of the pronotum (one and one-seventh in paratypic female), general form as in male but slightly narrower, more elongate lanceolate, greatest width (median) contained two and two-thirds times in length of same; as usual in females lacking the lateral bordering lamellation to the anal field; discoidal field with proximal coriaceous section embracing approximately one-fourth of tegminal length; general venation and areolation of tegmina as in male. Wings as in male.

Tenth abdominal tergite with its general structure as in female of *P. atlas*: ultimate tergite (supra-anal plate) scutellate, similar in shape to but distinctly broader than in the same sex of *atlas,* its median length but slightly greater than its proximal width, lateral margins moderately arcuate, apex rounded rectangulate, surface of proximal two-thirds with a triangular median impression, which is nearly equilateral in proportions and its greatest depth medio-longitudinal; cerci in length hardly surpassing the apex of the ultimate tergite, styliform, tapering, apices blunted and very faintly and briefly incurved; ovipositor equal in length to five-sixths that of the caudal femora, robust, relatively deep, arcuate and evenly narrowing distad of the proximal third, apex acute: ultimate sternite (subgenital plate) as in the female of *atlas* but shorter and stouter, with the apices of the bilobations shorter and less acutely produced.

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[41] In the allotype it is not definitely directed dorso-caudad, but is dorsal in trend. In the paratypic female, however, it is as in the male type.

Limbs as in male, but through the lesser production of the pronotum the cephalic femora are slightly longer, instead of shorter, than the pronotal disk: caudal femora subequal to the combined length of the pronotum and tegmina, apices well surpassing the apex of the abdomen.

Color.—General base color ranging from buckthorn brown to mummy brown, in the palest individual (type) the abdomen laterad being broadly clouded with mummy brown, this less definite in the paratype and not at all indicated in the quite dark allotype. Occiput more or less completely washed with fuscous, small areas of irregular ochraceous-buff present in several, the otherwise darkest allotype with these most evident: genae and face clouded with prout's brown on a pinkish buff ground; clypeus bicolored, pale ventrad, dark dorsad; mandibles largely prout's brown to mummy brown; eyes decolored; antennae with two proximal articles largely fuscous, spine of proximal one pale, fuscous tipped, remaining articles ferruginous to kaiser brown, becoming fuscous distad, the paler section multiannulate with fuscous. Pronotum with most of medio-cephalic spine quite pale, proximo-cephalic area of same fuscous, disk of metazona obscurely bimaculate or trimaculate with ochraceous-buff, the allotype and paratype showing a weak median lineation in addition to the paired blotches; medio-caudal spine pale, lateral spination and margins of the disk as a whole fuscous except where bisected by the pale paired blotches; lateral lobes of the general color. Tegmina with the base color light ochraceous-buff to ochraceous-buff, the venation almost completely pencilled with mummy brown, the areolar borders adjacent to the veins often clouded with the same, a definitely contrasted area of the pale base color without dark vein pencilling proximad in the discoidal field embracing from a fourth to a third of the length of the field. Wings more or less infumate. Abdomen with the pale dorsum in the male clear and unmarked, on each segment individually and lunately bordered by the dark lateral areas, which are but moderately broad, becoming nebulose ventrad, the lateral aspects of the whole abdomen with a ghost pattern of pale and very small dots; ovipositor of the general color, sometimes (paratype) becoming hay's russet distad. Pleura marked with fuscous. Limbs infumate with fuscous, the femoral and tibial apices particularly infuscate, spines fuscous, paler at tips or annulate with same; tarsi pale with lateral flaps fuscous.

Measurements (in millimeters)

	Length of body (exclusive of ovipositor)	Length of pronotum	Greatest width of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
♂, Mt. La Hotte, *type*	30.5	14	5.9	12.6	4.8	19.1	—
♀, N. E. foothills of La Hotte, *allotype*	30.7	11.5	5.5	14	4.5	20	16.4
♀, N. E. foothills of La Hotte, *paratype*	25	11	5	12.6	4.5	18.5	16.3

Paratypic Material.—In addition to the type and allotype I have before me a paratypic female bearing the same data as the allotype. As shown by the measurements this individual is slightly smaller than the described female but in other respects is very similar.

Variation.—The three specimens of the species now before me show that in the female sex the number of spines on the ventro-external margin of the caudal femora varies from seven to nine. Similarly the number of spines on the dorsal margins of the caudal tibiae ranges from as few as eight to as many as ten, while the ventral margins of the same show a variation ranging from eight to thirteen on the external and eight to nine on the internal.

Distribution.—The higher portions of the Massif de la Hotte, southwestern peninsula of Haiti, the lower border of its distribution apparently somewhere between 2000 and 4000 feet elevation.

Specimens Examined: 3; 1♂, 2♀.

Mount La Hotte, Massif de la Hotte, Republic of Haiti, 5000-7800 feet; October 16-17, 1934; (P. J. Darlington, Jr.); 1♂ (*type*); [M.C.Z.]. Northeastern foothills of Mount la Hotte, Massif de la Hotte, Republic of Haiti, 2000-4000 feet; October 10, 1934; (P. J. Darlington, Jr.); 2♀ (*allotype* and *paratype*); [M.C.Z. and A.N.S.P.].

Polyancistrus abbotti[42] new species (Pl. XXI, figs. 1, 2, 11 and 18.)

The salient features distinguishing this species from *darlingtoni,* its sole close relative, have been given in the key. This is the most aberrant member of the genus, distinctive in the extreme reduction of the alar organs to mere lobate appendages, projecting but little distad of the relatively broad cystoid metazonal bullation of the pronotum. The latter area is also unique in its smooth and polished character in the male.

Type.— ♂ ; Vicinity of La Visite, Massif de la Selle, Republic of Haiti, Hispaniola. Elevation, 5000-7000 feet. September 16-23, 1934. (P. J. Darlington, Jr.). [Museum of Comparative Zoology].

Size relatively small; form strongly brachypterous, metazonal inflation of pronotum pronounced, cystoid, dorsal surface smooth and polished.

Head with its general proportions, fastigial features, palpi, eyes and antennae as in *P. darlingtoni.*

Pronotum in its general form and proportions as in *P. darlingtoni,* the pronotal disk similarly divided and the two areas equally contrasted, greatest width across metazona equal to three-fifths of the pronotal length; surface of prozona and immediately cephalic section of the metazona of the disk rugulose but not cribroso-rugulose as in *darlingtoni,* inflated section of the metazonal disk strongly arcuate, both longitudinally and transversely cystoid in the tense roundness of its surface, the latter smooth and polished, with a shallow but definite and rounded medio-longitudinal groove, a low rudiment of the median strumosity seen in *P. darlingtoni* also present immediately cephalad of the transverse sulcus; median spine on cephalic margin pronounced, erect, not reflexed; lateral margins of disk with the spination in the more deplanate section similar to but more decided and elongate than in any of the other species, margins of metazonal portion of disk in shape more broadly arcuate than in the other species, strongly crenato-spinose, more decidedly so than in any other species of the genus, medio-caudal spine as in *P. darlingtoni;* transverse sulcus less sharply incised on the disk than in *P. darlingtoni* lateral lobes as in *P. darlingtoni.*

Tegmina greatly abbreviate, being merely stridulating organs, their total length approximately three-fifths of the pronotal length, and their apices extending caudad of the bullate metazona by not more than one-third of their total length, fitting closely beneath the cystoid inflation of the pronotum, and with the greatest combined width of their discoidal and marginal fields equal to approximately two-thirds of the tegminal length, the general form as viewed in dorso-lateral aspect, elliptical, the costal margin and the lamellate ridge laterad of the stridulating field almost equally arcuate, the apex rounded rectangulate, faintly oblique truncate on the sutural side distad of the arcuate lamellation: marginal field narrowly attenuate distad; discoidal field at its broadest point (mesad) equal to two and one-half times the proximal width of the marginal field: humeral trunk distinct, evenly convex toward costal margin, the discoidal vein quite stout and strongly elevated, more so than the humeral; venation of marginal field very irregularly anastomosing; discoidal field without definite longitudinal venation but numerous imperfectly indicated transverse straight or sinuose cross-veins. Wings developed but not reaching to tegminal apices.

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[42] Dedicated to the memory of the late Dr. William Louis Abbott, who was probably the greatest field naturalist America has produced, as a slight token of long friendship, sincere appreciation and high regard. Dr. Abbott's numerous zoological explorations in Hispaniola, and particularly those made on the Massifs de la Selle and de la Hotte, make the association of his name with this distinctive species most fitting.

Tenth abdominal tergite (anal segment) much as in *P. darlingtoni,* but paired lobes slightly longer and more produced, their distal margins fuller yet with the internal section of the same quite appreciably oblique subtruncate, median fissure similar to but less deeply incised than in *P. darlingtoni,* vesture similar: ultimate tergite (supra-anal plate) elongate acute trigonal, apex broadly rounded, surface shallowly impressed within margins, proximo-mesad is a deep narrow elongate-ovate indentation: cerci as in *P. darlingtoni* but recurved distal tooth shorter: ultimate sternite (subgenital plate) similar to that of *P. darlingtoni* but faintly shorter, details as in the preceding species.

Prosternal, mesosternal and metasternal spines as in *P. darlingtoni* but in each case slightly shorter and proportionately less elongate or acute.

Limbs in general as in *P. darlingtoni* but cephalic femora subequal to pronotal length, surface more heavily multistrumose, cephalic tibiae as in *darlingtoni*: caudal femora equal to approximate one and one-half times the pronotal length, the apices but briefly surpassing the abdominal apex, form as in *P. darlingtoni,* ventro-lateral margin with seven or eight spaced spines: caudal tibiae as in *darlingtoni* but with one or so less spines on each margin.[43]

Allotype.— ♀ ; same data as type. [Museum of Comparative Zoology].

Differing from the above description of the male sex in the following noteworthy features.

General form as in male with tegmina of approximately the same general size but metazonal inflation of pronotum less definitely cystoid, and its dorsal surface appreciably but finely ruguloso-shagreenous.

Pronotum as a whole somewhat narrower, the disk of the metazona less expanded transversely as well as less strongly arcuate both longitudinally and transversely, the greatest width across metazona equal to slightly less than half of the pronotal length, caudad convergence of lateral margins of the metazonal section of the disk sharper, straighter and less arcuate, and in consequence the caudal angulation is more decided; development of median spine of cephalic margin, armament of lateral margins and prozonal surface features as in male, metazonal disk without definite medio-longitudinal sulcation.

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[43] This is covered by individual variation in the series examined.

Tegmina in proportions much as in male, lacking the elevated arcuate lamellation laterad of the anal field found only in the male sex, the general outline, as seen in lateral aspect, in consequence not regularly elliptical, narrower, the breadth of the marginal and discoidal fields together equal to approximately half the tegminal length; costal margin broadly arcuate, apex rounded rectangulate, line of the dorsal and lateral fields straight when seen in lateral aspect, forming an obtuse-angle with the short, truly sutural margin; marginal field rather broad and uniform in character, width equal to approximately two-fifths that of the marginal and discoidal fields combined; venation of the latter fields as in male. Wings as in male.

Tenth abdominal tergite (anal segment) and ultimate tergite (supra-anal plate) as in the female of *P. darlingtoni*: ovipositor subequal to the caudal femora in length, similar to but slightly more slender and shallower than in *darlingtoni*: ultimate sternite (subgenital plate) of the type usual in the genus, with lateral processes acute, weakly lobulate prolonged, median emargination acute elongate semi-elliptical.

Cephalic femora approximately one and one-third times the pronotal length: caudal femora equal to one and three-fifth times the length of the pronotum, all other femoral and tibial features as in male.

Color.—General base color[44] ranging from as dark as cinnamon brown and prout's brown to as light as dresden brown and buckthorn brown (allotype only), the occiput, pronotal ridges and spines, virtually the whole of the surface of the inflated metazonal disk in the male, virtually all or certain areas of the tegmina, washes of variable extent laterad on the proximal portion of the abdomen, and proximal and distal clouds on the tibiae and also the lateral flaps of the tarsi, blackish fuscous. Eyes pale bister, variably marked with fuscous; palpi very pale buff, the distal area sometimes with distal two-thirds washed with fuscous; antennae with two proximal articles dark, distad of these kaiser brown to ochraceous-tawny, multiannulate with mummy brown, the dark annuli distad becoming progressively broader and the pale intervals fewer and more widely spaced. Tegmina with lateral field almost solidly fuscous in intensive extreme, with humeral vein finely pencilled in dull cream, the opposite extreme (recessive) has the base tegminal color, dull cream, the discoidal field particularly clear in proximal half, the distal half clouded or pencilled on some of the irregular cross-veins with fuscous, the humeral trunk and the usual position of the anal vein of the latter color. Limbs colored as in *P. darlingtoni*.

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[44] The Furcy male has had its color very definitely lightened by immersion at some time in a liquid preservative, and has been disregarded in the above color description.

The type represents the intensive extreme, the allotype the sole truly recessive specimen seen. The other La Visite specimens stand in an intermediate position but nearer the intensive end of the series.

Measurements (in millimeters)

	Length of body (exclusi of ovipositor)	Length of pronotum	Greatest width of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
♂, La Visite, *type*	28	10.9	6.1	6.6	4.1	17.3	—
♂, La Visite, *paratype* ...	—[45]	10	5.5	6	3.8	15	—
♂, Furcy, *paratype*	27.5	11.5	6	6.8	4.3	15.3	—
♀, La Visite, *allotype* ...	24.5	11	5.1	6.3	3.1	17.3	17

Paratypic series.—In addition to the type and paratype I have indicated as paratypes two males and a female bearing the same data as the type, and an additional male taken to Furcy, in the Massif de la Selle, by W. M. Mann.

Variation.—The measurements already given are from the extremes of the range in size of the species, the two females showing virtually no difference. The smaller La Visite male paratype is appreciably smaller than the others of that sex, and in addition it has the metazonal expansion with caudad more acutely converging lateral margins than in the others of the sex now before me. The emphasis of the medio-longitudinal sulcation of the same area varies in the male from that described in the type to virtually lacking.

Distribution.—The higher areas of the Massif de la Selle in the southwestern peninsula of Haiti. The lowest elevation from which it is known is that of Furcy, given as 1520 meters (4985 feet) by Woodring, Brown and Burbank.[46] The other individuals were taken at points between 5000 and 7000 feet.

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[45] Abdomen shrivelled and distorted.

[46] Geol. Rep. Haiti, p. 401, (1924).

Specimens examined: 6; 4♂, 2♀.

Vicinity of La Visite, Massif de la Selle, Haiti, elevation 5000-7000 feet; September 16-23, 1934; (P. J. Darlington, Jr.); three males (*type* and *paratypes*), two females (*allotype* and *paratype*), one immature female; [M.C.Z. and A.N.S.P.]. Furcy, Massif de la Selle, Haiti; (W. M. Mann); one male; [M.C.Z.].

Origin, Dispersal and Evolution

Schuchert in his recent invaluable analysis of our knowledge of the historical geology of the Antillean-Caribbean region[47] summarized the Caenozoic evidence available on Hispaniola in the following words: "Hispaniola was land during early Eocene, early and late Oligocene, late Miocene and early Pliocene times, when it was connected with Jamaica and Puerto Rico. At all other epochs more or less large islands remained here and retained some of the inherited life. Because of these conditions, Hispaniola and eastern Jamaica may be looked upon as the main asylum for the preserval of ancient Antillean land life."

In map 15 at the end of his volume Schuchert shows the Honduranian-Antillean land bridge as still existing in Upper Miocene and Lower Pliocene times. In his opinion Puerto Rico, Hispaniola and Jamaica were then connected with each other and with Honduras, but Cuba was detached. The other maps presented by him would indicate that, in his opinion, the last direct (or indirect via Jamaica) connection of Hispaniola and Cuba was not more recent than the Lower Oligocene.

The same author (p. 438) has quoted Vaughan to the effect that Hispaniola " lies at the convergence of the trend of the axis of the central subprovince of Cuba and the Honduras-Jamaican axis. The dividing line is from Port au Prince to Ocoa Bay. The arc south of this line belongs to a Jamaican axis, while that to the north belongs to the central Cuban trend."

From this geological evidence one may conclude that *Polyancistrus* represents a relatively old type which doubtless ancestrally reached Hispaniola from Central America by way of the Antillean land-bridge and Jamaica. We have no knowledge of near relatives existing in Jamaica, but the existence of the related *Polyancistroides* in Cuba would indicate the presence of the stock in the Antilles at least as far back as the Lower Oligocene.

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[47] Historical Geology of the Antillean-Caribbean Region, pp. 16-17, (1935).

From one view-point it would seem the genus had its center of dispersal in the southwestern peninsula of the island, as there we find the greatest differentiation and specialization, all three basic groups being represented, i. e. the fully alate and more generalized *serrulatus-atlas* complex, the aberrant *gerulus* assemblage and the very distinctive, montane and markedly specialized *darlingtoni-abbotti* group. To this territory five of the eight known forms are entirely, or almost entirely, confined. This peninsula, which rises in the high massives of La Hotte and La Selle, each with a very peculiar species of *Polyancistrus*, contains no deposits, except on marginal shelves or in inlet valleys, younger than the Eocene.[48] The whole of the southwest peninsula is cut off from the remainder of the island by the Cul-de-Sac Plain and Enriquillo Basin, which in no place is more than a few hundred feet above sea-level and in one area is one hundred and fifty feet below, there with a lake (Lake Enriquillo) filled with water more saline than that of the sea. Woodring has considered the deposits of this area to be of Pleistocene marine origin, the rocks mainly coral-reef and shell limestone deposits. Cooke[49] states the Cul-de-Sac Plain has been so little modified by erosion that the visitor "has the unique experience of walking dry-shod on the bottom of the sea across shell-strewn sands and of wandering among forests of corals that appear so fresh that the water might have been withdrawn only yesterday."

Examining the situation from a different angle it is seen that while we have but three forms of *Polyancistrus* known from the main Dominican mass of the island, and two of these are altitudinally distributed races of the same species, the third is very close to *P. gerulus,* which is known only from the north coast of the southwestern peninsula. This third form is also a markedly brachypterous type, although it is not limited to high elevations as are the other brachypterous members of the genus.

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[48] See the geological map of Haiti by Woodring, Brown and Burbank, 1924, as redrawn by Schuchert (fig. 69, p. 441).

[49] In Vaughan, Cooke and Woodring, Memoirs of the Geological Survey of the Dominican Republic, I, (1921).

Assuming that the macropterous types are the more primitive ones, in accordance with the generally accepted conclusion as to macropterism being primitive, and allowing full weight to the more extensive distribution of the completely alate forms, it would seem that these have had a considerable antiquity and their differentiation has been due to factors not now clearly evident but probably not very recent. The racial splitting of each of the two species involved is, however, much more readily evident. On the other hand the Haitian brachypterous species (*darlingtoni* and *abbotti*), as far as we know, have developed solely in the southwestern peninsula, probably isolated there from the other portions of the island by the Pleistocene and prior submergences of the Enriquillo and Cul-de-Sac region. The history of the *gerulus-loripes* group is not so clear. Assuming the brevialate *gerulus* to be more primitive than the brachypterous *loripes* one can conclude this group also has had a considerable part of its development cycle in the southwestern peninsula, but the strongly marked-off characters of *loripes* would point to a much more ancient establishment in the central part of the Dominican Republic than post-Pleistocene. It is probable that *gerulus* is a relict member of a group which had reached the main central mass of the island and had sustained definite modification, prior to the Pleistocene submergence of the Enriquillo-Cul-de-Sac district. Probably this was during the Pliocene, which was there a time of emergence according to Schuchert. While we need to know much regarding the form or forms of the genus to be found in a number of areas in the island, certainly the marine channel which in Pleistocene times covered the Cul-de-Sac Plain was a very important factor in the segregation of species.

Clearly the two brachypterous and greatly modified high mountain species of the ancient La Selle and La Hotte massives (*P. darlingtoni* and *abbotti*) represent specialized types. By analogy I would conclude their common ancestor to have been a fully winged species, and their present aborted tegmina and wings due to subsequent evolutionary adaptation to their high mountain habitats.

EXPLANATION OF PLATES

PLATE XX

Fig. 1.—*Polyancistrus serrulatus serrulatus* (Beauvois). "San Domingo." Lateral view of male. (X 1½.)

Fig. 2.—*Polyancistrus serrulatus serrulatus* (Beauvois). "San Domingo." Dorsal view of pronotum of male. (X 1½.)

Fig. 3.—*Polyancistrus serrulatus serrulatus* (Beauvois). "San Domingo." Lateral view of pronotum of female. (X 1½.)

Fig. 4.—*Polyancistrus serrulatus oreiotes* new subspecies. Manabao, Dominican Republic. Dorsal view of pronotum of male (*type*). (X 1½.)

Fig. 5.—*Polyancistrus serrulatus oreiotes* new subspecies. Manabao, Dominican Republic. Lateral view of pronotum of male (*type*). (X 1½.)

Fig. 6.—*Polyancistrus gerulus* new species. Miragoane, Haiti. Lateral view of male (*type*). (X 1½.)

Fig. 7.—*Polyancistrus gerulus* new species. Miragoane, Haiti. Dorsal view of pronotum of male (*type*). (X 1½.)

Fig. 8.—*Polyancistrus gerulus* new species. Miragoane, Haiti. Dorsal view of pronotum of female (*allotype*). (X 1½.)

Fig. 9.—*Polyancistrus gerulus* new species. Miragoane, Haiti. Lateral view of pronotum of female (*allotype*). (X 1½.)

Fig. 10.—*Polyancistrus loripes* new species. Constanza, Dominican Republic. Lateral view of male (*type*). (X 1¼.)

Fig. 11.—*Polyancistrus loripes* new species. Constanza, Dominican Republic. Dorsal view of pronotum of male (*type*). (X 1¼.)

Fig. 12.—*Polyancistrus loripes* new species. Jarabacoa, Dominican Republic. Dorsal view of pronotum of female (*allotype*). (X 1¼.)

PLATE XXI

Fig. 1.—*Polyancistrus abbotti* new species. La Visite, La Selle, Haiti. Lateral view of male (*type*). (X 2.)

Fig. 2.—*Polyancistrus abbotti* new species. La Visite, La Selle, Haiti. Dorsal view of pronotum of male (*type*). (X 2.)

Fig. 3.—*Polyancistrus darlingtoni* new species. Mount La Hotte, Haiti. Dorsal view of pronotum of male (*type*). (X 1½.)

Fig. 4.—*Polyancistrus darlingtoni* new species. Mount La Hotte, Haiti. Lateral view of pronotum of male (*type*). (X 1½.)

Fig. 5.—*Polyancistrus serrulatus oreiotes* new subspecies. Manabao, Dominican Republic. Lateral view of tegmen of male (*type*). (X 1½.)

Fig. 6.—*Polyancistrus atlas atlas* new species. Fond des Negres, Haiti. Lateral view of tegmen of male (*type*). (X 1½.)

Fig. 7.—*Polyancistrus atlas pilanus* new subspecies. Furcy, Haiti. Lateral view of tegmen of male (*type*). (X 1½.)

Fig. 8.—*Polyancistrus gerulus* new species. Miragoane, Haiti. Lateral view of tegmen of female (*allotype*). (X 1½.)

Fig. 9.—*Polyancistrus darlingtoni* new species. Mount La Hotte, Haiti. Lateral view of tegmen of male (*type*). (X 1½.)

Fig. 10.—*Polyancistrus darlingtoni* new species. Northeast foothills of La Hotte, Haiti. Lateral view of tegmen of female (*allotype*). (X 1½.)

Fig. 11.—*Polyancistrus abbotti* new species. La Visite, La Selle, Haiti. Lateral view of tegmen of female (*allotype*). (X 2.)

Fig. 12.—*Polyancistrus serrulatus serrulatus* (Beauvois). "San Domingo." Dorsal view of tenth abdominal tergite of male. (Greatly enlarged.)

Fig. 13.—*Polyancistrus atlas atlas* new species. Fond des Negres, Haiti. Dorsal view of tenth abdominal tergite of male (*type*). (Greatly enlarged.)

Fig. 14.—*Polyancistrus gerulus* new species. Miragoane, Haiti. Dorsal view of tenth abdominal tergite of male (*type*). (Greatly enlarged.)

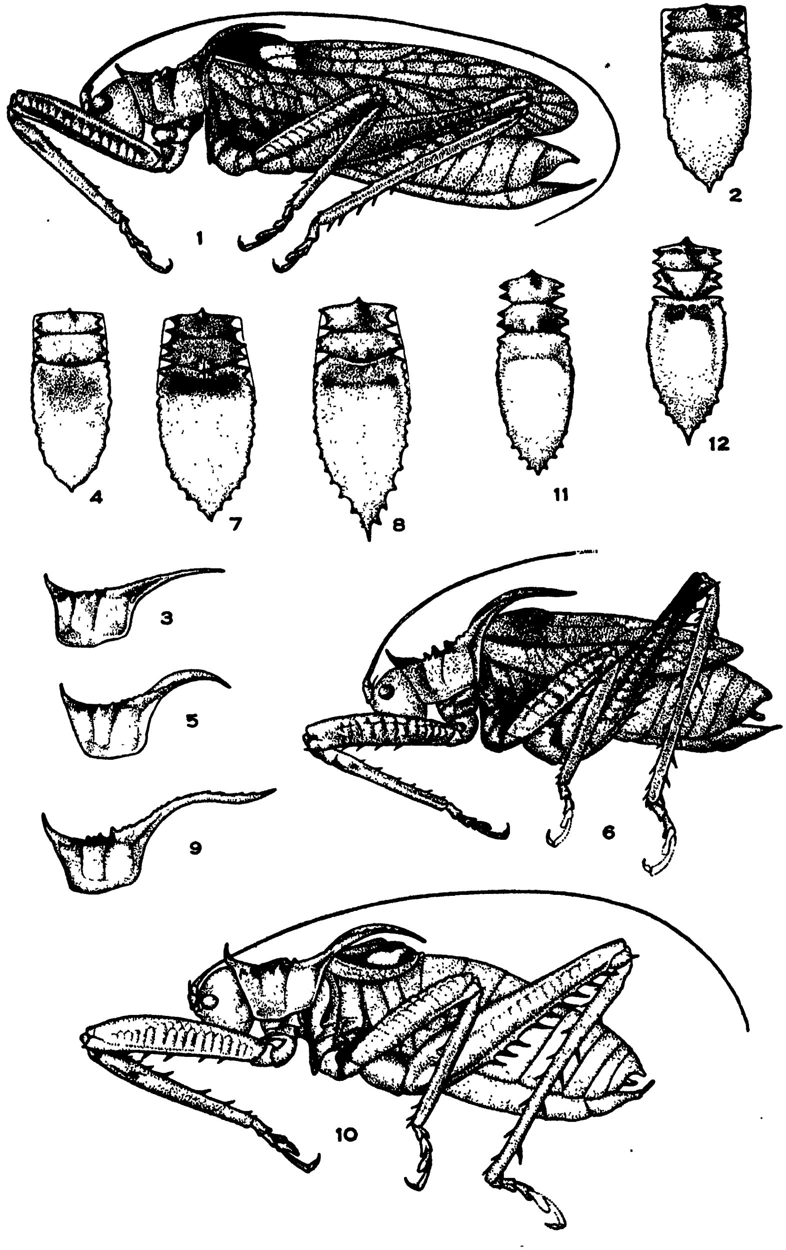
Fig. 15.—*Polyancistrus loripes* new species. Constanza, Dominican Republic. Dorsal view of tenth abdominal tergite of male (*type*). (Greatly enlarged.)

Fig. 16.—*Polyancistrus gerulus* new species. Miragoane, Haiti. Lateral outline of ovipositor of female (*allotype*). (X 1½.)

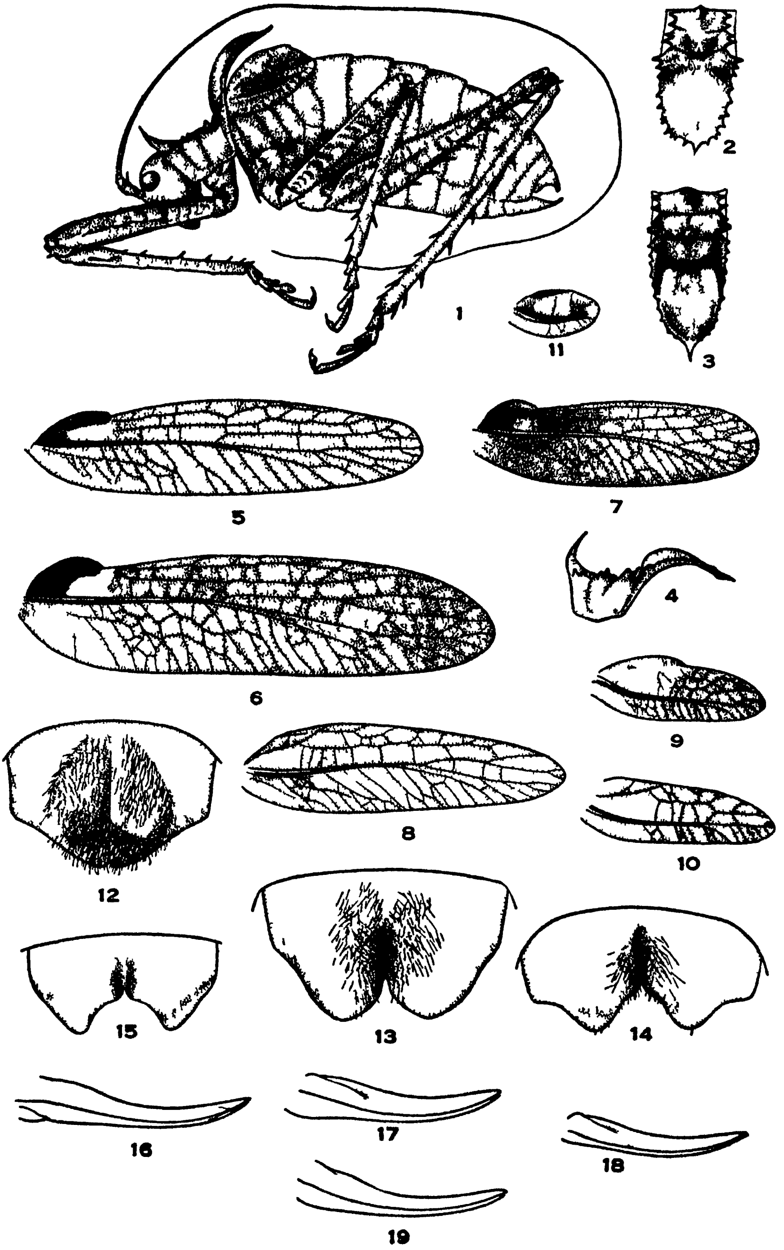
Fig. 17.—*Polyancistrus darlingtoni* new species. Northeast foothills of La Hotte, Haiti. Lateral outline of ovipositor of female (*allotype*). (X 1½.)

Fig. 18.—*Polyancistrus abbotti* new species. La Visite, La Selle, Haiti. Lateral outline of ovipositor of female (*allotype*.) (X 1½.)

Fig. 19.—*Polyancistrus loripes* new species. Jarabacoa, Dominican Republic. Lateral outline of ovipositor of female (*allotype*). (X 1¼.)



REHN—POLYANCISTRUS



REHN—POLYANCISTRUS

A NEW SPECIES OF THE GENUS GRYLLITA FROM CUBA

(ORTHOPTERA: GRYLLIDAE, GRYLLINAE)

BY JAMES A. G. REHN

(Text figure)

Recently Dr. S. C. Bruner, Chief of the Department of Phytopathology of the Estacion Experimental Agronomica at Santiago de las Vegas, Cuba, sent to me for determination two specimens of a most interesting gryllid, which proved to represent an undescribed species of the genus *Gryllita*, a group previously unknown from the Greater Antilles. This assemblage bears a considerable resemblance to the well-known Antillean genus *Anurogryllus*, but in addition to a number of other differences the female possesses a fully developed ovipositor, as in the majority of gryllid genera.

I wish to thank Dr. Bruner for the privilege of examining and describing this most interesting form.

Gryllita cubensis new species

More nearly related to *Gryllita tolteca* (Saussure), of Mexico, than to the genotype *G. arizonae* Hebard, from extreme southern Arizona.[1] From *tolteca* (Saussure), of which a paratypic male from Potrero, Mexico, collected by Sumichrast and received from the Geneva Museum, as well as a female from Motzorongo, Vera Cruz, Mexico, both in the Hebard Collection, are now before me, the present species differs in the longer and more slender limbs, particularly in the male sex, the longer and more attenuate marginal spines of the caudal tibiae, in the lateral field of the male tegmina having fewer (four instead of seven) veins, the tegmina of the female being non-attingent, lateral and little evident, in the ultimate sternite (subgenital plate) of the male being more elongate and gutter-like, shallower and less strongly compressed and not distally truncate when seen in profile, while the ovipositor of the female is much longer, in fact slightly longer than the caudal femur, instead of not over two-thirds as long. The male type is much smaller than the male of *tolteca* now before me, but the allotypic female is little different in size from the specimen of that sex of *tolteca* now in hand. In consequence I am considering this size difference as a non-diagnostic and individual feature. Owing to pinning damage to much of the dorsal field of the tegmina of the unique male of the new species I am not drawing upon this area for differential characters.

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[1] The genus *Gryllita* was described by Hebard in 1935 (Trans. Amer. Entom. Soc., LXI, pp. 147-148), based on *G. arizonae*, there described, and including *Gryllodes tolteca* and *forcipata* Saussure.

From *G. arizonae* Hebard the present species can at once be separated by the much less elongate tegmina of the male, the longer and more slender limbs, proportionately shorter cephalic tarsi and longer and more rostrate ultimate sternite (subgenital plate) of the male.

As stated by Hebard, it is probable that Redtenbacher's *Gryllodes rufipes*[2] is a member of this genus, but at all events it is less intimately related to *G. cubensis* than to *G. tolteca,* judging from its possession of well developed and evident tegmina in the female. The description and figure of *rufipes* leave much to be desired, but the species is clearly distinct from that here described.

Type.— ♂ ; Central Baragua, southwestern Camaguey Province, Cuba. June 5, 1936. (Scaramuzza; taken on soil). [Academy of Natural Sciences of Philadelphia, Type no. 5558].

Size relatively small; form and general appearance as in *G. tolteca* but limbs more slender and elongate.

Head with greatest width not exceeding that of pronotum at cephalic border, little conspicuous, not projecting at all laterad; when seen in cephalic aspect the greatest width of head across eyes is equal to five-sixths the greatest depth of same; inter-antennal protuberance low when seen from dorsum, from cephalic aspect broad, equal to half interocular width, subequal, in profile vertex is distinctly oblique declivent from the narrowly rounded occiput to the inter-antennal protuberance, eye in outline rounded rectangulate, greatest width approximately three-fourths of greatest depth: palpi with ultimate article one and one-third times the length of the penultimate, elongate securiform, greatest width mesad and equal to one-fourth of length; penultimate and ante-penultimate articles subequal in length, latter slightly more robust than former: antennae somewhat exceeding body in length, proximal article deplanate, subhexagonal in outline, slightly broader than long.

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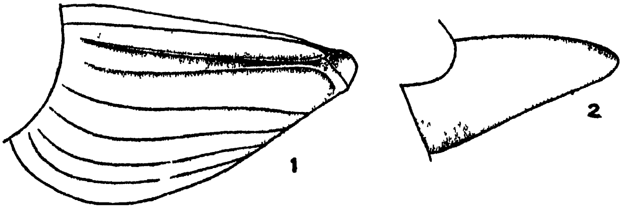
[2] Proc. Zool. Soc. London, 1892, p. 217, pl. 17, fig. 15. [♀ ; Richmond, St. Vincent, B. W. I.]

Pronotum subquadrate, slightly broader than long, greatest width equal to one and one-fourth times length; cephalic and caudal margins, as seen from dorsum, very faintly concave, lateral margins in same view straight and parallel, shallow medio-longitudinal impression indicated between the submarginal cingulations, usual median paired elongate subreniform impressions indicated briefly cephalad of middle: lateral lobes of pronotum subrectangulate, slightly shallower caudad than cephalad, ventro-cephalic angle narrowly rounded rectangulate, ventral margin straight and weakly oblique in cephalic two-thirds, ventro-caudal angle well rounded: surface of pronotum well supplied with short hairs and short adpressed chaetae, distinctly longer chaetae sparsely scattered over surface and markedly developed as definite cephalic and caudal marginal fringes.

Tegmina equal to one and one-half times the pronotal length, seen from dorsum roughly quadrate, the greatest width of a single tegmen, seen in that aspect, equal to five-sixths of its length, region of the humeral trunk gently arcuate when seen from dorsum, distal margin of dorsal field arcuate, exact shape of sutural margin not evident, due to accidental folding of tegmen: oblique veins two in number, speculum with proportions approximately of length as three to width as five, cephalic border of same obtuse-angulate: lateral field broad, greatest (dorsal) length equal to approximately twice greatest width (at proximal third), costal margin strongly arcuate proximad, thence distad the width regularly narrows to distal extremity, free veins of lateral field four in number, regularly spaced. Wings if present solely rudimentary.

Abdomen tapering, semifusiform, surface rather thickly supplied with short, adpressed subchaetiform hairs. Evident ultimate tergite (subgenital plate) elongate, equilaterally trigonal, apex relatively acute, shallow medio-longitudinal impression indicated except distad: cerci elongate, tapering, subequal to caudal tibiae in length: ultimate evident sternite (subgenital plate) moderately produced, scoop-like, dorso-lateral margin arcuate when in profile, apex not at all truncate in same view, in ventral aspect the sternite regularly narrows distad, not at all compressed, apex narrow and sharply rounded.

Cephalic femora relatively slender, equal in length to the pronotal width, depth equal to three-tenths of length; over all length of cephalic tibiae subequal to that of femora, caudal face with elongate elliptical auditory foramen; cephalic tarsi with proximal article equal to one and one-half times length of distal one. Median femora slightly longer than cephalic, slightly more slender. Caudal femora moderately robust, greatest median depth contained three times in length, immediately pregenicular depth one-third of greatest depth of femur; caudal tibiae equal to two-thirds the femoral length, moderately robust, faintly arcuate when seen in lateral aspect, dorso-external spines six in number,[8] dorso-internals of same number but slightly longer, both series slightly falcate with apices more strongly arcuate; three pairs of distal spurs, external with median spur four-tenths the length of proximal tarsal article and half again as long as the dorsal one, ventral but slightly more than half length of median, dorsal and median internal spurs larger than external, median almost equal to six-tenths the length of the proximal tarsal article and four-fifths that of the dorsal spur, the latter twice the length of the dorso-external, ventro-internal faintly shorter than the ventro-external: length of entire tarsus equal to one and four-tenth times that of tibia, proximal article (exclusive of distal spurs) comprising nine-thirteenths of total tarsal length, dorsal margins with eight external and seven internal spaced dentations, internal distal spur half again as long as external; distal tarsal article but slightly longer than a third the proximal one (as 3.5 to 9).



Gryllita cubensis new species. Male (*type*). Central Baragua, Camaguey Province, Cuba.

Fig. 1.—Lateral view of tegmen. (× 10.) Fig. 2.—Lateral view of ultimate sternite (subgenital plate). (Greatly enlarged.)

Allotype.— ♀; Puerto Soriano, eastern Oriente Province, Cuba. June 14, 1936. (Scaramuzza). [Academy of Natural Sciences of Philadelphia].

Differing from the above description of the male sex in the following noteworthy features.

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[8] The structure here considered the dorso-external spur may be classed as a marginal spine by some students, as in position it is truly marginal, apparently having moved somewhat proximad of the normal position of the spur. In this *cubensis* agrees with *arizonae* and *tolteca*. However, I am considering this a distal spur, the dorsal of three external ones, as any other arrangement would reduce the number of external spurs to two. A logical differentiation of articulate spines from the distal spurs is not at all easy, and until we know more about their development present conclusions are merely tentative.

Head very slightly broader, greatest width across eyes equal to seven-eighths the depth of same when seen in cephalic aspect.

Pronotum as in male.

Tegmina strongly lateral very brief structures, projecting but very slightly caudad of the caudal margin of the pronotum, and more distinctly evident in lateral aspect than from dorsum due to the arcuation of the margin of the lateral lobes, in general outline transversely rectangulate,[4] distal margin slightly oblique subtruncate, inclining laterad, costal margin moderately arcuate, disto-costal angle rounded rectangulate; visible venation simple, longitudinal, regularly spaced veins, eight being apparent but additional ones probably concealed under pronotum. No evident wings present.

Evident ultimate tergite (subgenital plate) of same form as in male but surface more distinctly and deeply impresso-excavate, a larger portion of the surface of the tergite being involved: evident ultimate sternite (subgenital plate) short, scoop-like, strongly arcuate in transverse section, distal margin, as seen from venter, subtruncate: ovipositor valves strongly produced, more elongate than in *G. tolteca* or *arizonae,* in length nearly one and one-half times that of the caudal tibiae, slender, straight; distal valves acute lanceolate, apices quite slender, valve margins entire, surface of same laterad obliquely differentiated from that of shaft.

Limbs as in male except that the caudal limbs have the dorso-internal distal tibial spur subequal in length to the dorso-median; proximal caudal tarsal article with dentations of dorsal margins numbering six to seven on external and six on internal margins.

General color of head dull zinc orange, of dorsum of pronotum hazel (♂) to dull hay's russet (♀), male tegmina prout's brown, abdomen fuscous, limbs of male ochraceous-buff, of female the same washed with zinc orange, becoming buckthorn brown on the caudal tibiae and tarsi. Antennae dresden brown, palpi ochraceous-buff, eyes mars brown (♂) to fuscous (♀). Lateral lobes of pronotum with an indefinitely delimited area of ochraceous-buff ventro-cephalad, ventral margin of same pencilled with fuscous, caudal section of lateral lobes washed more (♀) or less (♂) distinctly with fuscous. Lateral field of male tegmina ochraceous-buff, clouded distad with prout's brown, veins of humeral trunk lined with ochraceous-tawny. Distal margin of abdominal tergites of male very narrowly edged with pale buffy; male ultimate tergite largely pale, cerci pale proximad becoming progressively darker distad; female cerci dresden brown; ovipositor sanford brown, pencilled with fuscous along the suture, apex fuscous. Tibial spines and tibial and tarsal spurs narrowly tipped with fuscous, tarsal spines largely fuscous.

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[4] The extent to which the tegmina are normally separated cannot be determined, as the left tegmen is missing from the allotype.

Measurements (in millimeters)

	Length of body (exclusive of ovipositor)	Length of pronotum	Length of tegmen	Length of caudal femur	Length of ovipositor
♂, Baragua, *type*	11.3	2.35	3.78	8	—
♀, Puerto Soriano, *allotype*	15.8	3.27	.75[5]	10.3	11.3

I have seen only the type and allotype of this interesting species.

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[5] This measurement is taken from the caudal margin of the pronotum to the distal margin of the tegmen. In lateral view, due to the arcuation of the margin of the lateral lobe of the pronotum, more of the tegmen is evident.

A REVISION OF THE GENUS MEGACHILE IN THE NEARCTIC REGION[1]

PART V[2]

TAXONOMY OF SUBGENUS XEROMEGACHILE

(Hymenoptera: Megachilidae)

BY THEODORE B. MITCHELL

(Plates XXII-XXVI)

The subgenus *Xeromegachile* includes a large group of species which seems to be peculiar to the Nearctic Region, with at present no known representatives from any other part of the world. The majority of the species appear to be adapted to sandy and often more or less arid regions, and many of them are quite highly specialized, apparent both in their structural characteristics and in the narrow range of flowers upon which they depend. This food limitation has resulted in a shortening of the flight period and apparently also in a geographical localization of many of the species. Both of these factors, time and space, have probably functioned as isolating agents and the result is seen in the multiplicity of closely allied but apparently distinct species.

Because of the apparently limited range and flight period of many of the species, representatives are found but rarely in collections. As a consequence the difficulties met with in the study of the group are considerable. Many species are known only from one or two specimens, and then usually in but one sex. Thus the two sexes may be known, but under different names, and much additional data must be obtained before these sexes can be associated with reasonable accuracy. The sexes have been correlated in several of the better known species (*brimleyi, casadae, dakotensis, deflexa, integra, integrella, manifesta, nevadensis, rubi, subnigra, wheeleri*), although many of these were originally described under two different names. Fairly conclusive evidence for the association of the sexes of two others (*histrata*= *fucata* ♀, and *smithi*= *palmensis* ♀) has recently been obtained. The sexes of the numerous remaining species are still to be determined. The list of males includes *alata, angelica, bruneri, instita, legalis, micheneri, mucorosa, soledadensis, victoriana* and *wyomingensis*. The list of females includes *blaisdelli, bradleyi, coloradensis, dulciana, hilata, impartita, latita, mojavensis, moschata, nelsoni, oslari, pagosiana, parksi, pseudonigra, redlandica, seducta* and *toscata*.

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[1] Contribution from the Department of Zoology and Entomology, North Carolina State College, published with the approval of the Director of the North Carolina Experiment Station as Paper no. 89 of the Journal Series.

[2] Parts I, II, III, and IV, Trans. Am. Ent. Soc., LIX, pp. 295-361, (1934); LXI, pp. 1-44, (1935); LXI, pp. 155-205, (1935); LXII, pp. 117-166, (1936).

Four of the species described in the male sex (*maurata, micheneri, victoriana* and *wyomingensis*) are represented by unique specimens, as also eight of the species described in the other sex (*coloradensis, duciana, impartita, nelsoni, oslari, pagosiana, seducta* and *toscata*). It is quite possible, of course, that a more complete knowledge of these will result in the reduction of some of the names to synonomy, although the differences, between the males especially, are of such a degree as to lead to the belief that this will not happen in many cases. It is probable, however, that several additions to synonomy will result from the correlation of the sexes of these at present poorly represented species.

A group of such proportions, including so many closely related forms, presents additional difficulties in the construction of a usable key. Less difficulty will probably be experienced in tracing the males, since their differences are more readily observed and more easily stated. With the females, however, the differences are often so slight, or so often involve characters which are too variable to be desirable as key characters, that considerable difficulty may be experienced in tracing them through the key. If color were more reliable, a key could be much more easily constructed and used, but since it is so unreliable, determinations of females in this group are subject to a considerable margin of error.

Subgenus **XEROMEGACHILE** Mitchell

Xeromegachile Mitchell, Trans. Am. Ent. Soc., LIX, p. 302, 1934.

First and second joints of labial palpus subequal; maxillary palpi minutely pubescent or bare, the apical joint longer than the other two.

Female.—Mandible 4-dentate, a cutting edge between the two inner teeth, and sometimes a vestige of one between the second and third; basal joint of flagellum longer than either the pedicel or the second joint; metatarsi definitely shorter than their tibiae, but the mid and hind metatarsi often approaching their tibiae in width; claws often with robust basal setae which are tooth-like in appearance; abdomen cordate or ovoid, second and third terga usually rather deeply depressed basally, the more apical terga quite deeply depressed across apical margins and this accentuated toward the sides; sixth tergum approximately straight in profile, the sixth sternum usually quite uniformly covered with scopal hairs, and without any bare lip or projection beyond the scopal area.

Male.—Mandible usually 3-dentate, with a robust inferior projection located somewhere between the center and base of the lower margin; basal joint of flagellum usually slightly shorter than the second joint, but sometimes subequal or even longer, the apical one frequently but not always dilated and flattened; front coxae definitely spined, often bare and shining anteriorly, and usually with a dense patch of short reddish bristles just latero-cephalad of the base of each spine; inferior rim of front femur frequently pronounced and keel-like apically, the posterior face usually punctate and more or less pubescent, the other two faces polished and impunctate; outer face of front tibia punctate and pubescent, the other two faces polished and impunctate; front tarsus more frequently dilated, the metatarsus longer than the second and third joints combined and usually excavated anteriorly and with a pronounced posterior fringe; mid tibia with the usual apical spur, and mid metatarsus often with a long posterior fringe; claws dilated basally, but without distinct basal teeth; fourth sternum exposed; carina of sixth tergum entire medially, usually rounded or acute, never definitely emarginate; apical margin of the tergum with pronounced carinate median teeth which are usually nearer the small lateral teeth than to each other; seventh tergum usually relatively large and often with a median protuberance or spine;

Male sternites: Fourth sternum exposed; fifth presternite with a more heavily sclerotized apical plate on each side of the medasternite, the presternite much reduced medially, sometimes linear, the medasternite usually distinct and setose, a distinct poststernal strip extending between the apical presternal sclerites bounding the apical margin of the medasternite; sixth sternum much shorter than the fifth, with a definite median angulate poststernal lobe, the medasternal area divided medially into two distinct parts, each of which is usually narrowed laterally, and is more or less densely setose.

Genital armature: Stipites narrowed above base and usually somewhat sinuate, dilated and obliquely compressed to the apex, this usually pubescent or setose; sagittae relatively straight, usually exceeding the stipites, the tips bowed so that they become approximate.

GENOTYPE: *Megachile integra* Cresson. [Orthotype.]

Key to Species of Xeromegachile

(Including also males of *Derotropis*)

Females

1. Lateral ocelli much nearer eyes than to edge of vertex; pubescence of sixth tergum largely appressed, the erect hairs basal, short and inconspicuous 2

Lateral ocelli subequally distant from eyes and edge of vertex, or nearer the vertex; or pubescence of sixth tergum erect and conspicuous ... 3

2. Clypeal margin straight and entire .... *dakotensis* Mitchell

Clypeal margin with a narrow median incurved area in the center of which is a minute denticle; large robust species ..... *deflexa* Cresson

3. Scopa entirely black 4

Scopa largely white or ochraceous 7

4. Vertex, dorsum of thorax and basal abdominal terga black pubescent. *pseudonigra* Mitchell

Vertex, dorsum of thorax and basal abdominal terga pale pubescent at least in part 5

5. Apical abdominal terga beyond the second entirely lacking pale apical fasciae .... *subnigra* Cresson

Third to fifth abdominal terga with conspicuous white apical fasciae .. 6

6. Pleura above, mesonotum, scutellum and first and second abdominal terga entirely white pubescent; punctures of fourth and fifth terga more sparse and minute, the surface between them polished. *oslari* Mitchell

Pleura above largely dark pubescent; mesonotum with a median patch of black pubescence; second tergum black pubescent, with a white apical fascia; punctures of fourth and fifth terga more distinct and close, the surface between them not highly polished. *blaisedelli* Mitchell

7. Clypeal margin minutely denticulate or tuberculate 8

Clypeal margin entire 10

8. Scopa entirely black on fifth and sixth sterna, entirely white on all others; fourth tergum with a distinct carinate basal transverse depression .... *parksi* new species

Scopa of fifth sternum largely pale; basal transverse depression of fourth tergum obliterated medially, carinate only toward the sides .. 9

9. Punctures fine and close in center of mesonotum, minute and crowded on scutellum; scopa on fifth sternum with few if any black hairs. *integra* Cresson

Punctures more coarse in center of mesonotum, separated by more than their own width; punctures on scutellum fine and close, but distinct, not crowded except anteriorly; scopa on fifth sternum black along posterior margin ....*brimleyi* Mitchell

10. Clypeus polished and subimpunctate 11

Clypeus quite distinctly and usually closely punctate 13

11. Lateral ocelli only slightly nearer edge of vertex than to eyes; scopa of sixth sternum usually dark ....*cascadae* Cockerell

Distance between lateral ocelli and edge of vertex about half that between ocelli and eyes 12

12. Sixth tergum largely black pubescent above, scopa more white, that on sixth sternum largely black; posterior fringe of front metatarsus fully as long as the metatarsus ....*palmensis* Mitchell

Sixth tergum white pubescent above except at extreme base, and scopa more yellow, that on the sixth sternum largely pale; front metatarsal fringe not extremely long ....*dulciana* Mitchell

13. Sixth tergum in profile with no erect or suberect hairs visible, the pubescence very short and closely appressed ....*rubi* Mitchell

Sixth tergum in profile with at least suberect hairs visible 14

14. Scopa except for an apical darker tuft on the sixth sternum, entirely pale 15

Scopa entirely black on sixth sternum 19

15. Punctures in center of mesonotum well separated; those on fifth tergum relatively distinct and definitely separated 16

Mesonotum densely punctate throughout 18

16. Punctures more coarse and sparse on vertex laterally. *hookeri* Cockerell

Punctures of vertex more uniformly fine and close, only slightly more coarse and distant laterally 17

17. Punctures very fine and closely crowded on upper portion of clypeus, more coarse and irregular on the lower portion; pubescence of sixth tergum largely pale, the scattered basal dark hair very inconspicuous. *hilata* Mitchell

Punctures on upper portion of clypeus coarse and close, those on the lower portion more irregular but about equal in size; pubescence of sixth tergum black and erect basally, silvery and appressed apically, but with a median line of fuscous to the tip .....*redlandica* Mitchell

18. Punctures of fifth tergum uniformly fine and dense throughout. *coloradensis* new species

Punctures of fifth tergum irregular, coarser and more sparse apically than basally ....*toscata* Mitchell

19. Fifth tergum polished with widely spaced, fine punctures, the basal groove obliterated medially, the carina evident only laterally; punctures of scutellum minute and densely crowded.
wheeleri Mitchell

Fifth tergum usually with rather close punctures, not polished, but if so, the disc has a distinct basal carina across entire width or the punctures of the scutellum medially are distinctly separated 20

20. Scopa on fifth sternum entirely pale, that on the sixth entirely black 21

Scopa on fifth sternum black at least in part 24

21. Scutellum finely and closely punctate, but the punctures distinct with definite intervening shining spaces, at least medially; punctures of mesonotum quite widely separated medially; punctures of vertex uniformly fine and close, only very slightly more coarse laterally.
redlandica Mitchell

Scutellum with fine densely crowded punctures throughout 22

22. Fifth tergum with a distinct transverse basal groove, delimited by a low carina across entire disc 23

Basal groove of fifth tergum obliterated medially, the carina evident only laterally ....*bradleyi* Mitchell

23. Fifth tergum polished, with widely spaced punctures; punctures on vertex considerably more coarse and sparse laterally than medially; punctures of clypeus fine and densely crowded throughout.
nevadensis Cresson

Fifth tergum not polished, the punctures quite close and rather coarse; punctures of vertex slightly more coarse and more widely separated laterally than medially; punctures of clypeus rather shallow and indistinct, close but not crowded ....*nelsoni* new species

24. Scopa of fifth sternum black apically, pale basally 25

Scopa of fifth sternum entirely black 27

25. Punctures of mesonotum and scutellum close and fine, separated distinctly only in center of mesonotum, if at all ..*manifesta* Cresson

Punctures of mesonotum and scutellum definitely separated, rather widely so medially 26

26. Punctures of clypeus close and rather fine, almost crowded; scutellum and second tergum with definitely black pubescence; basal groove of third tergum deep, narrow, and definite, with a distinct apical as well as basal margin; eastern ....*integrella* Mitchell

Punctures of clypeus more coarse and more definitely separated although close in general; pubescence of scutellum and second tergum entirely pale; basal groove of third tergum less definite, lacking a distinct apical margin; western ....*mojavensis* Mitchell

27. Front coxae with fuscous pubescence; that on the mesonotum, scutellum and first and second terga largely or entirely pale.
pagosiana Mitchell

Front coxae pale pubescent 28

28. Pubescence of mesonotum and scutellum entirely pale 29
Mesonotum and scutellum with considerable fuscous or blackish pubescence 30

29. Punctures of scutellum fine and crowded, fine and close on the shining disc of the fifth tergum; pubescence on disc of second tergum laterally with a slight intermixture of dark hairs; vertex with considerable dark pubescence ....*latita* Mitchell
Punctures of scutellum more distinctly separated, although fine and close, those on the discs of the fourth and fifth terga minute and relatively sparse; pubescence of second tergum entirely pale, that on the vertex laterally with short intermixed dark hairs, but these inevident medially ....*impartita* Mitchell

30. Punctures in center of mesonotum and scutellum minute, separated by much more than their width, very fine and crowded over entire clypeus ....*histrata* Mitchell
Punctures in center of mesonotum and scutellum quite coarse, separated by not more than their own width; punctures of clypeus quite coarse, deep and distinct, close but hardly crowded 31

31. Punctures of vertex more uniformly close and fine, only slightly more coarse laterally ....*seducta* Mitchell
Punctures of vertex considerably more coarse and more widely spaced laterally than in center ....*moschata* Mitchell

Males

1. Front metatarsi simple, neither excavated nor dilated 2
Front metatarsi more or less dilated, usually with colors other than black, and more or less excavated on the anterior margin 7

2. Mandibles distinctly 4-dentate ....*deflexa* var. *coreopsana* Mitchell
Mandibles distinctly 3-dentate 3

3. Front tarsi yellowish, contrasting with the black or piceous mid and hind tarsi 4
Front tarsi not contrasting with the others, all either black, piceous or ferruginous 6

4. Apical margin of third abdominal tergum deeply depressed medially. *dakotensis* Mitchell
Apical margin of third tergum but very slightly depressed medially, if at all 5

5. Punctures of vertex and mesonotum about equal in size, the surface between the punctures shining ....*integrella* Mitchell
Punctures in center of mesonotum somewhat coarser and more widely separated than those on vertex, the surface between the punctures very dull, minutely tessellated ....*legalis* Cresson

6. Large and robust; punctures of mesonotum close and rather coarse, distinct, the surface between them shining ....*deflexa* Cresson
Smaller; surface of mesonotum finely tessellated and dull, the punctures fine, sparse and indistinct ....*mucorosa* Cockerell

7. Clypeal margin, beneath beard, with a median triangular emargination 8
   Clypeal margin either straight or broadly incurved 10
8. Mesosternum with a sharp spine just anterior to each mid coxa. *Derotropis gravita* Mitchell
   Mesosternum not spined 9
9. Median emargination of clypeus relatively shallow, broader than it is deep; carina of sixth tergum angulate medially, but not protuberant; fifth tergum not fasciate, the punctures relatively sparse and minute, the surface polished ....*Derotropis alamosana* Mitchell
   Median emargination of clypeus deep, about as deep as it is broad; carina of sixth tergum abruptly protuberant medially; fifth tergum fasciate, the punctures relatively close, the surface shining. *Derotropis pascoensis* Mitchell
10. Mesonotum almost impunctate, the surface tessellate, with minute, widely scattered obscure punctures; carina of sixth tergum entire and evenly rounded; front metatarsi equalling their tibiae in breadth ....*Derotropis xerophila* Cockerell
    Mesonotum with distinct and relatively close punctures 11
11. Mesosternum with a pair of flattened carina-like protuberances just posterior to the front coxae 12
    Mesosternum lacking carina-like protuberances 13
12. Front coxal spines extremely large, spatulate, fully twice as long as broad basally, the coxa lacking the usual patch of red bristles, the surface polished; seventh tergum with a short inconspicuous terminal spine ....*wheeleri* Mitchell
    Front coxal spines robust, but relatively short, not much longer than broad at base, the coxa having a distinct patch of short ferruginous bristles at the base of the spine; seventh tergum with a long slender terminal spine ....*nevadensis* Cresson
13. Pubescence of mid and hind legs black ....*subnigra* Cresson
    Pubescence of legs largely pale 14
14. Front coxal spines extremely large, spatulate, about twice as long as broad at base, coxae polished, lacking the usual patch of red bristles ....*manifesta* Cresson
    Front coxa bearing a patch of reddish bristles at the base of the spine, the spine either slender, or if spatulate, hardly longer than broad at base 15
15. Front coxal spines broadly spatulate, almost triangular, robust 16
    Front coxal spines more slender and spine-like 18
16. Seventh tergum not spined ....*brimleyi* Mitchell
    Seventh tergum terminated by a distinct median spine 17

17. Fourth and fifth terga polished, with sparse minute punctures; scutellum with a median impunctate line ....*maurata* new species
Fourth and fifth terga with fine distinct close punctures, the surface shining; punctures of scutellum more uniform, without a definite impunctate line ....*angelica* Mitchell

18. Seventh tergum either not protuberant or with a triangular median protuberance which is not spine-like, being broader at base than it is long 19
Seventh tergum terminated by a quite definite spine-like median protuberance 23

19. Seventh tergum broadly rounded or subtriangular 20
Seventh tergum triangularly pointed medially 21

20. Front metatarsi broadly dilated, equalling their tibiae in width; carina of sixth tergum broadly rounded and entire ....*integra* Cresson
Front metatarsi relatively slender, distinctly narrower than their tibiae; carina of sixth tergum broadly rounded, but the margin irregularly crenulate ....*brimleyi* Mitchell

21. Front metatarsi relatively slender, distinctly narrower than their tibiae; mesonotum with an inconspicuous median patch of dark pubescence; apical joint of antennae not appreciably dilated .....*institia* Mitchell
Front metatarsi equalling their tibiae in breadth; pubescence of mesonotum entirely pale; apical joint of antenna dilated 22

22. Carina of sixth tergum entire, tegulae rather deep ferruginous; front femora entirely yellowish-ferruginous on upper and posterior faces, the apical half broadly dilated with a pronounced ventral keel; middle tooth of mandible emarginate apically ....*victoriana* Mitchell
Carina of sixth tergum finely and irregularly crenulate medially, the base with a rather pronounced median ridge; tegulae pale yellow; front femur mostly blackish on upper and posterior faces, the apical half only moderately dilated, with a less evident ventral keel; middle tooth of mandible not emarginate ....*soledadensis* Cockerell

23. Pubescence entirely pale, including even that on the fourth and fifth terga; apical joint of antenna but very slightly dilated, if at all ...24
At least the fourth and fifth terga with some dark pubescence; apical joint of antenna quite distinctly dilated 26

24. Lateral ocelli considerably nearer eyes than to edge of vertex, sixth tergum with a distinct dorsal median ridge above the carina; punctures very close over entire mesonotum, slightly separated only in center.
micheneri new species
Lateral ocelli only slightly nearer eyes than to edge of vertex; dorsal surface of sixth tergum above the carina without a distinct ridge; punctures in center of mesonotum separated by about their own width 25

25. Terminal median spine of seventh tergum very short, subtriangular; front femur only moderately dilated apically, the margin of the ventral keel edged with yellow; the posterior face otherwise piceous; front metatarsi yellow, subequal in width to their tibiae. *wyomingensis* Mitchell

Terminal spine of seventh tergum long and slender; front femur more broadly dilated apically, the margin of the ventral keel dark ferruginous, resembling the remainder of the posterior face in color; front metatarsi yellow, slightly narrower than their tibiae. *bruneri* Mitchell

26. Apical margin of clypeus beneath beard broadly incurved 27

Apical margin of clypeus straight 28

27. Surface of clypeus beneath the dense pubescence uniformly covered with fine densely crowded punctures; front metatarsi relatively narrow, margined with fuscous on both anterior and posterior borders ....*alata* Mitchell

Surface of clypeus beneath the dense pubescence shining, the punctures fine and rather widely separated, at least above; front metatarsi almost as wide as their tibiae, only obscurely darkened along posterior border ....*palmensis* Mitchell

28. Surface of clypeus beneath the dense pubescence shining, the punctures minute and obscure; front metatarsi almost as wide as their tibiae. *casadae* Cockerell

Surface of clypeus beneath the dense pubescence covered with fine densely crowded punctures; front metatarsi distinctly narrower than their tibiae 29

29. Front metatarsi entirely yellow on outer face; punctures of mesonotum very close except in a restricted central area; eastern ..*rubi* Mitchell

Front metatarsi margined with fuscous on both posterior and anterior borders; punctures of mesonotum relatively fine and sparse, widely separated over much of its area medially; western ...*fucata* Mitchell

Megachile (Xeromegachile) deflexa Cresson

(Pls. XXII and XXIII.)

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Megachile megagyna Cockerell, Can. Ent., XLI, p. 394, 1909.

Megachile indianorum Cockerell, Ann. Mag. Nat. Hist. (8), XI, p. 533, 1913.

Megachile indianorum var. a Cockerell, Ann. Mag. Nat. Hist. (8), XV, p. 531, 1915.

Megachile (*Xeromegachile*) *coreopsana* Mitchell, Trans. Ann. Ent. Soc., LIX, p. 319, 1934.

It has become evident, recently, that *coreopsana* (male) represents one extreme of variation in *deflexa*. At the time it was described its small size in comparison with *deflexa* and the distinctly 4-dentate condition of the mandible led to the belief that it was distinct. Material recently collected, however, indicates that the mandibles are quite variable. The middle tooth is emarginated typically, but the resulting pair of angles are not always equal. In those specimens in which these two angles approach equality the mandible becomes quite conspicuously 4-dentate; but in many individuals the outer of the two angles is small and inconspicuous, resulting in a quite definite 3-dentate condition.

This species is evidently more generalized than most of its relatives in *Xeromegachile*, and is quite unique within the group. It possibly represents a more primitive type, resembling, perhaps, the parent stock from which the numerous species in the group were derived.

Female.—Size: Length 15-17 mm. breadth of abdomen 5 mm.; anterior wing 11 mm.

Structure: Face considerably broader than long; eyes slightly convergent below; clypeal margin almost straight, with a slight median denticle and with a slight protuberance at either side of middle; mandible 4-dentate; basal joint of flagellum slightly longer than pedicel, and very slightly longer than the second joint; lateral ocelli considerably nearer eyes than to edge of vertex, and closer to each other than to eyes; vertex very nearly flat; cheeks subequal in width to eyes; hind metatarsi nearly as broad as their tibiae, but distinctly shorter; abdomen cordate, broad and rather flat, apical and basal margins of terga slightly depressed; sixth tergum straight at sides in dorsal aspect, rounded apically, straight in profile, with the visible pubescence largely appressed.

Puncturation: Fine and close on head, thorax and basal abdominal segments, but somewhat coarser on lower part of clypeus; more sparse on the more apical abdominal segments, but very fine and close on the sixth.

Color: Black; antennae reddish-piceous beneath; tegulae dark reddish, with a yellow anterior rim; wings quite deeply infuscated, especially apically, the nervures piceous; legs dark, the spurs pale ferruginous.

Pubescence: Short and whitish on face, cheeks, pleura, propodeum and basal abdominal segment; extremely short and dark on vertex, mesonotum and scutellum, these parts practically bare, and very short and blackish on second to fifth abdominal terga, subappressed and silvery on the sixth, but becoming brownish apically; first to fifth terga with entire white apical fasciae; the scutello-mesothoracic suture with a very narrow but rather distinct whitish fascia; scopa whitish, fuscous on the sixth sternum.

Male.—Size: Length 15 mm.; breadth of abdomen 4.5 mm.; anterior wing 9.5 mm.

Structure: Face about as broad above as long; eyes very slightly convergent below; clypeal margin with a shallow median incurved area in the center of which is a minute denticle; mandible 4-dentate, with the subapical tooth often small and inconspicuous, the inferior projection subbasal, slender, acute, relatively small; basal joint of flagellum slightly longer than pedicel, and second joint slightly longer than first, apical one neither dilated nor flattened; lateral ocelli considerably nearer eyes than to edge of vertex, and slightly nearer each other than to eyes; vertex nearly flat; cheeks subequal in width to eyes; coxal spines short, flattened, subtriangular, coxae slightly pubescent anteriorly, without any evident patch of red bristles; front femora hardly dilated, slightly carinate on inferior margin apically; front tarsi slender and simple, neither dilated, flattened, nor excavated; abdomen rather broad and flat, parallel-sided, third to fifth terga with depressed apical margins, the second to the fourth quite deeply depressed basally; carina of sixth tergum subtriangular, entire, apical margin of the tergum with the carinate median teeth slightly nearer the smaller lateral teeth than to each other; seventh tergum barely visible, straight, lacking any median protuberance or spine.

Sternites: Fifth sternum not well differentiated into pre-, meda- and poststernites, but with an obscure line delimiting an apical presternal plate on each side, the median portion of the presternite linear, the medasternite broad, sparsely covered with minute setae, the basal margin obscure, poststernal strip broadly and slightly incurved medially, not distinct from the apical margin of the medasternite; lateral portions of sixth presternite longer than broad, the inner half of the apical margin on each side concave, the outer half convex, medasternal areas separated medially, ovoid, rather sparsely covered with short setae, poststernal lobe very short and broad, the lateral angles slightly produced.

Genital armature: Stipites narrowed above base, only slightly dilated and sinuate toward the tip, but compressed just before the tip, the inner face of this compressed area sparsely covered with minute hairs; sagittae about equally robust as the stipites, quite strongly bowed, the tips considerably dilated and approximate, not exceeding the stipites in length; volsellae robust, subtruncate.

Puncturation: Fine and close on cheeks, pleura, scutellum and basal abdominal segments; slightly more coarse but close on vertex and on mesonotum medially; fine but slightly more sparse on the more apical abdominal terga, but fine and close on the sixth.

Color: Black; antennae reddish-piceous beneath; tegulae dark reddish, with bronzy or hyaline blotches; wings subhyaline, clouded apically, the nervures brownish to piceous; legs ferruginous, the front tarsi slightly more yellowish; spurs ferruginous to brownish-yellow.

Pubescence: Whitish on face, cheeks, pleura, propodeum, scutellum, and on basal and apical abdominal segments; short and fuscous on vertex and largely so on mesonotum; second to fifth abdominal terga with very short pubescence which appears dark only at certain angles; first to fifth terga with entire whitish apical fasciae, and the scutello-mesothoracic suture inconspicuously white-fasciate.

Type.—Male; Kansas, [A.N.S.P., no. 2441].

Range.—Eastern North Carolina, along the coast to Florida, west to Texas, and northward to Nebraska, June, July, and August. Definite records are as follows:

FLORIDA: 1♂, 2♀, Indian Reservation. 2♂, 1♀, Jacksonville Beach, Aug. 3 and 5, 1936, (Mitchell). 2♂, Coral Gables, Apr. 5 and 21, 1935, (J. Pearson; on *Geobalanus pallidus*).

NEBRASKA: 1♂, Haigler, July, (M. H. Siocuk; on *Verbena*). Identified also from Halsey, Aug. 26, 1912.

NORTH CAROLINA: 1♂, Marston, July 4, 1928, (Mitchell; on *Coreopsis*. Type of *coreopsana*). 5♀, 1♂, Wilmington, Aug. 1 to Sept. 14, (Mitchell).

TEXAS: 1♂, Bexar County, June 14, 1931, (H. B. Parks; on *Gaillardia amblydon*). 1♂, 1♀, Fedor, Lee County, June 25, 1909. 1♂, 2♀, Lee County, June 18 and 21, and July 10, 1906, (Birkmann). 3♀, Medina County, June 23, 1931, (H. B. Parks; on *Petalostemen?*).

Flower records.—*Strophostyles* sp., *Verbena* sp., *Gaillardia amblydon*, *Geobalanus pallidus*, *Coreopsis* sp.

Megachile (Xeromegachile) dakotensis Mitchell
(Pls. XXII and XXIII.)

Megachile dakotensis Mitchell, Psyche, XXXIII, p. 164, 1926.

Female.—Size: Length 13 mm.; breadth of abdomen 4.5 mm.; anterior wing 8.5 mm.

Structure: Face slightly broader than long; eyes subparallel; clypeal margin entire, smooth and shining, slightly produced laterally; mandible 4-dentate; second joint of flagellum subequal to pedicel, the first joint longer; lateral ocelli nearer eyes than to edge of vertex; vertex very slightly rounded; cheeks subequal in width to eyes; hind metatarsi almost equalling their tibiae in breadth, but distinctly shorter; abdomen rather broad, ovoid, third to fifth terga strongly depressed apically (not so strongly as in male, however) and with very deep basal grooves, the anterior borders of the latter carinate and slightly overlapping the grooves; sixth tergum in dorsal aspect obtusely triangular, straight in profile, with a slight median longitudinal ridge.

Puncturation: Fine and close on face, on vertex medially, and on pleura, scutellum and basal abdominal segment; somewhat coarser and more sparse on lower part of clypeus and on vertex laterally; rather coarse and shallow on cheeks; quite sparse in center of mesonotum which is tessellate and dull; relatively sparse but fine on apical abdominal terga except the sixth, where they are close and fine.

Color: Black, antennae piceous beneath; tegulae dark ferruginous; wings subhyaline basally, dusky apically, nervures piceous to ferruginous; legs black, but all the tibiae ferruginous apically.

Pubescence: White and rather short on face, cheeks, thorax laterally and posteriorly, and basal abdominal segment; very short above, with some inconspicuous dark pubescence on vertex and mesonotum, extremely short and blackish on second to fifth terga, more evident laterally, the sixth tergum with a few short black basal hairs with white tomentum apically; first to fifth terga with entire narrow white apical fasciae, more dense laterally; scopa white, black on the sixth sternum and across the fifth apically.

Male.—Size: Length 10-11 mm.; breadth of abdomen 4 mm.; anterior wing 8 mm.

Structure: Face slightly broader above than long; eyes very slightly convergent below; clypeal margin straight and entire; mandible 3-dentate, second tooth the smallest, inferior projection slightly nearer base than apex of mandible; basal joint of flagellum slightly longer than the pedicel, the second joint longer than the first, the apical one neither dilated nor flattened; lateral ocelli nearer eyes than to edge of vertex; vertex nearly flat; cheeks subequal to eyes in width; coxal spines short, flattened, triangularly pointed, strongly divergent, with no red bristles on coxae anteriorly; front femora keeled beneath apically; front tarsi simple, not at all dilated or excavated; second to fifth abdominal terga very strongly depressed apically, the discs overhanging the margin on the fourth and fifth, the terga rather strongly depressed basally also, giving the discs a rolled appearance; carina of sixth tergum. entire, rounded, with fine irregular crenulations, apical margin of the tergum with carinate median teeth which are slightly nearer the small acute lateral teeth than to each other; seventh tergum evident, with a median triangularly pointed spine.

Sternites: Fifth presternite extensive, the median portion about half as long as the medasternite, the lateral portions with poorly delimited ovoid apical sclerites which are finely pubescent, the medasternite three or four times broader than long, uniformly but rather sparsely covered with short fine setae, the apical margin straight, basal margin ellipsoid, and entire, the poststernal strip broadly and slightly incurved medially; lateral portions of sixth presternite much longer than broad, rounded apically, the medasternal areas extensive medially though definitely separated, narrowed laterally, uniformly covered with short robust setae, the poststernal lobe broad and very short, the lateral angles produced and acute.

Genital armature: Stipites much constricted above base, slightly sinuate and much dilated apically, the dorsal surface near the tip sparsely set with short fine setae, the tip with a tuft of longer hairs, sagittae quite robust, the tips somewhat dilated, definitely exceeding the stipites; volsellae subtriangular, with rounded tips.

Puncturation: Fine and close throughout, but somewhat more distinctly separated on the shining vertex; abdominal terga also shining between the close punctures, the thorax uniformly dull.

Color: Black; antennae obscurely reddish below; tegulae ferruginous; wings subhyaline, more clouded apically, the nervures piceous; legs black in general, but the front tibiae yellowish apically, and the front tarsi yellowish; spurs yellow; mid and hind tibiae ferruginous apically.

Pubescence: Pale ochraceous to white on head, thorax, and first two abdominal segments; vertex and mesonotum with a small amount of brownish-fuscous pubescence, and third to fifth abdominal terga with some very short inconspicuous blackish pubescence, the second to the fifth with entire white apical fasciae, the fourth to sixth with considerable white tomentum basally; tarsal fringes white, the front ones yellowish-brown beneath.

Type.—Male; Hot Springs, South Dakota, July 10, 1924, [S. D. State College].

Allotype.—Female: Ft. Pierre, South Dakota, August 11, 1924, [S. D. State College].

Range.—Montana to Minnesota, south to Nebraska, June to August. Definite records include the following:

MONTANA: 1 ♀, no locality record.

NEBRASKA: 1 ♂, 2 ♀, Bad Lands, Sioux County, Aug. 10, 1908. 2 ♂, Carno, July 3, 1902, (on *Verbena*). 3 ♂, 5 ♀, Glen, Sioux County, Aug. 9-15, 1905 (2 ♀ on *Petalostemon*). 1 ♂, Gordon, Sheridan County, Aug. 27, 1905. 1 ♀, Halsey, July 11, 1909. 4 ♂, 1 ♀, Monroe Canyon, Aug. 3-20, 1908, (on damp ground). 1 ♂, Sioux County. Also identified from War Bonnet Canyon.

NORTH DAKOTA: 2 ♂, 1 ♀, Washburn, July 23, 1926, (O. A. Stevens; on *Kuhnistera digophylla*).

SOUTH DAKOTA: 1 paratype ♂, Hot Springs, July 7, 1924. Identified also from Rosebud.

Flower records.—*Helianthus* sp., *Petalostemon violaceus*, *Cleome serrulata*, *Verbena* sp., *Kuhnistera candida* and *K. oligophylla* and *Amorpha canescans.*

Megachile (Xeromegachile) legalis Cresson

(Pls. XXII and XXIII.)

Megachile legalis Cresson, Trans. Am. Ent. Soc., VII, p. 209, 1879. Friese, Das Tierr., Lfg. 28, Apidae I, p. 240, 1911. Cresson, Mem. Am. Ent. Soc. I, p. 122, 1916.

Male.—Size: Length 11-12 mm.; breadth of abdomen 4 mm.; anterior wing 8 mm.

Structure: Face about as broad as long; eyes slightly convergent below; clypeal margin entire; mandible 3-dentate, inferior projection subbasal, relatively slender, slightly curved; basal joint of flagellum slightly longer than pedicel, the second joint longer than the first, the apical one flattened and slightly dilated; lateral ocelli subequally distant from eyes and edge of vertex; vertex flat; cheeks subequal in width to eyes; coxal spines of moderate length, rather narrow, flattened, coxae largely bare anteriorly, each with a patch of reddish bristles anterior to the spines; front femora keeled beneath apically; front tarsi slightly dilated, but distinctly narrower than their tibiae, but little flattened, and the anterior margin of the metatarsus not at all excavated; abdomen more or less parallel-sided, the more apical terga deeply depressed apically, the basal depressions slight; carina of sixth tergum subtriangular, apical margin of the tergum with carinate median teeth which are considerably nearer the obscure lateral teeth than to each other; seventh tergum small, pointed medially.

Sternites: Apical presternal sclerites of fifth sternum small and rather poorly defined, quite densely pubescent, the presternite not linear medially, the medasternite rather widely separated from the presternite, but with an obscure basal margin, well covered with fine setae which are abruptly and broadly dilated and abruptly truncated apically, many of them practically T-shape, others more oblique, posternal strip broadly and slightly incurved medially, lacking the median hair-tuft; lateral portions of sixth presternite rather longer than broad, the medasternal areas extensive, especially medially, definitely separated medially, closely beset with short erect simple setae, the posternal lobe extensive, lateral angles considerably produced and acute.

Genital armature: Stipites narrowed above base, sinuate apically, slightly dilated just beyond middle, with a small amount of pubescence dorsally and laterally at apex and a small and inconspicuous ventral subapical ridge or knob which is minutely setose; sagittae moderately robust, considerably exceeding the stipites; volsellae triangular apically.

Puncturation: Very fine shallow and close on cheeks, pleura and basal abdominal segments; somewhat more coarse and distinctly separated on vertex and mesonotum, where the surface is finely tessellated between punctures, the scutellum more shining, with close punctures; apical abdominal terga shining, with relatively coarse sparse punctures.

Color: Black; antennae dark red beneath; tegulae ferruginous; wings subhyaline, very faintly clouded apically, the nervures pale yellowish-brown; front femur dark on upper and posterior faces, the anterior face yellowish; front tibia dark on outer face except the apex, otherwise yellowish; front tarsi yellowish, second joint with a dark spot beneath.

Pubescence: Entirely whitish, with no apparent intermixture of dark hairs on any part; tarsal fringes entirely white.

Type.—Male; Nevada, [A.N.S.P., no. 2464].

Range.—Colorado and Nevada, August. 2 ♂ from Nevada are at hand, which are probably a part of the original type series, although not so labelled.

Megachile (Xeromegachile) integrella Mitchell

(Pls. XXII and XXIII.)

Megachile integrella Mitchell, Trans. Am. Ent. Soc., LII, p. 116, 1926.

The male of this species has more recently been discovered, and is described here for the first time.

Female.—Size: Length 10-12 mm.; breadth of abdomen 4-5 mm.; anterior wing 8 mm.

Structure: Face about as long as broad; eyes subparallel; clypeal margin broadly and shallowly incurved, subentire or minutely serrate; mandible 4-dentate; second joint of flagellum subequal to pedicel, the basal joint somewhat longer; lateral ocelli subequally distant from eyes and edge of vertex, vertex nearly flat; cheeks subequal in width to eyes; hind metatarsi shorter than their tibiae, but almost equal in breadth; abdomen cordate, rather broad and flat, second to fourth terga rather deeply grooved basally, apical margins of the fourth and fifth rather deeply depressed, the sixth triangular in dorsal aspect, rounded apically, the sides nearly straight, and straight in profile with only suberect hairs visible toward the base.

Puncturation: Close and rather fine on pleura; slightly more coarse but close on cheeks and clypeus; rather widely separated on vertex laterally, but close around ocelli; sparse on disc of mesonotum, but close anteriorly and laterally; quite widely separated on scutellum medially, close laterally; minute and very close on abdomen basally, becoming slightly more coarse and distinct to the fifth tergum, close on the sixth.

Color: Black; antennae beneath and tegulae more fuscous; wings lightly infuscated, slightly darker apically, nervures fuscous; spurs yellow.

Pubescence: White on face, cheeks, pleura, propodeum, legs, and basal abdominal segment; fuscous to black on vertex and mesonotum, and across scutellum anteriorly, the latter white pubescent posteriorly; short and black on second to fifth abdominal terga, with a slight amount across the base of the sixth, the latter largely covered with white tomentum, this becoming brownish apically; second to fifth terga with entire white apical fasciae; dorsum of thorax without conspicuous lines or fasciae of white tomentum; scopa white, black on sixth sternum and across the apical margin of the fifth.

Male.—Size: Length 10-11 mm.; breadth of abdomen 4 mm.; anterior wing 7.5 mm.

Structure: Face slightly longer than broad; eyes slightly converging below; clypeal margin nearly straight, slightly incurved medially; mandible 3-dentate, inferior projection acute, slightly nearer base than apex of mandible; basal joint of flagellum subequal to pedicel, second joint slightly longer, apical one neither dilated nor flattened; lateral ocelli slightly nearer eyes than to edge of vertex; vertex nearly flat; cheeks barely as wide as eyes; coxal spines short, hardly longer than broad basally, with an obscure patch of reddish bristles anteriorly, but otherwise only thinly pubescent in front; front femora slightly dilated, the lower margin keeled apically; front tarsi neither dilated, flattened nor excavated anteriorly; abdominal terga considerably depressed basally, the fourth and fifth deeply depressed apically, the third only toward the sides; carina of sixth tergum rounded, irregularly serrate or with shallow irregular indentations, apical margin of the tergum with carinate median teeth which are nearer the obscure lateral teeth than to each other; seventh tergum triangularly pointed medially.

Sternites: Apical presternal sclerites of fifth sternum only partially delimited, rather extensive, with a few scattered minute hairs apically, the presternite not linear medially, the medasternite rather widely separated from the presternite laterally, sparsely covered with minute simple setae, the posternal strip narrow, broadly and slightly incurved medially, lacking the usual median hair-tuft; lateral portions of sixth presternite longer than broad, the medasternal areas quite extensive medially, narrowed laterally, definitely but not widely separated medially, carinate apically, rather uniformly covered with rather robust sinuate and spatulate setae, the poststernal lobe broad and very short, lateral angles produced into elongate acute lobes.

Genital armature: Stipites much constricted above base, broadly dilated and sinuate apically, with an apical tuft of fine hairs and a ventral subapical oblique carinate ridge which is beset with minute hairs; sagittae only moderately robust, slightly exceeding the stipites; volsellae obliquely truncate apically, almost triangular.

Puncturation: Fine and close on cheeks below and on pleura; coarser but more close and shallow on cheeks above; more sparse on vertex, but close around ocelli; rather sparse on mesonotum medially, becoming close around the margin, definitely separated on scutellum; minute and quite close on abdomen basally, becoming slightly more coarse and more definitely separated on the more apical terga.

Color: Black; antennae beneath and tegulae more fuscous; wings subhyaline basally, lightly infuscated apically, the nervures fuscous; front femur largely black on posterior face and tibia on outer face, otherwise these joints ferruginous; front tarsi yellow, margined posteriorly with fuscous; spurs pale yellow.

Pubescence: White on face, cheeks, pleura, propodeum, scutellum medially, legs and basal segment of abdomen; rather long and fuscous on vertex and mesonotum, and at each side of scutellum; very short and blackish on second to fifth abdominal terga, but the fifth with white tomentum basally, entirely white on the sixth; second to fifth terga with narrow, entire, white apical fasciae; dorsum of thorax without conspicuous lines or fasciae of white tomentum.

Type.—Female; Wilmington, N. C., June 30, 1925, (Mitchell; on *Hypericum* sp.) [U.S.N.M., no. 29068].

Range.—Eastern North Carolina to Florida, May and June. Definite records are as follows:

FLORIDA: 1♂, Fort Myers, June, (Van Duzee).

NORTH CAROLINA: 3♂, 3♀, Carolina Beach, June 12 and 22, 1929 and 1930, (2♀, on *Hypericum,* 1♀ & 1♂ on a legume, 2♂ on *Oxydendrum*?). 1♂, 2♀, Fort Fisher, June 22, 1929, (on *Hypericum*). 1♂, White Lake, May 20, 1934.

Flower Records.—*Hypericum* sp., *Oxydendrum* (?).

Megachile (Xeromegachile) integra Cresson

(Pls. XXII and XXV.)

Megachile integra Cresson, Trans. Am. Ent. Soc., VII, p. 121, 1878. Friese, Das Tierr. Lfg. 28, Apidae I, p. 239, 1911. Cresson, Mem. Am. Ent. Soc., I, p. 120, 1916. Mitchell, Trans. Am. Ent. Soc., LII, p. 115, 117, 1926. Mitchell, Psyche, XXXIV, p. 179, 1927.

Megachile strophostylis Robertson, Can. Ent., XXXVI, p. 277, 1904.

This species varies considerably as to color of pubescence, individuals from Texas (the type locality) having more uniformly ochraceous pubescence and fasciae, and less dark pubescence on vertex, mesonotum and abdomen.

Female.—Size: Length 11-13 mm.; breadth of abdomen 4-4.5 mm.; anterior wing 8 mm.

Structure: Face slightly broader than long; eyes slightly converging below; slypeal margin with a small median denticle and minute lateral ones; mandible 4-dentate; basal joint of flagellum subequal in length to pedicel, the second joint slightly shorter; lateral ocelli slightly nearer eyes than to edge of vertex; vertex flat; cheeks narroweer than eyes; hind metatarsi almost equalling their tibiae in width, but definitely shorter; abdomen cordate; second and third terga rather deeply grooved basally, the fourth only slightly so, apical margins of the third to the fifth somewhat depressed, more so laterally, the sixth straight in profile, straight at sides with the apex broadly rounded in dorsal aspect, with but few erect hairs.

Puncturation: Close and fine throughout with the exception of the clypeus where the punctures are relatively coarse, deep, and definitely separated, at least medially; the tegula closely and minutely punctate.

Color: Black; antennae beneath, tegulae, and wing nervures brownish-ferruginous; wings faintly infuscated, slightly darker apically; spurs ferruginous.

Pubescence: Whitish or pale ochraceous on face, cheeks, pleura, propodeum and basal segment of abdomen; short, and brownish or fuscous on vertex and dorsum of thorax; very short and blackish on second to fifth abdominal terga, the sixth with silvery tomentum, but this more brownish toward the tip, and with some short erect dark hairs toward the base; first to fifth terga with entire, but usually narrow, whitish or pale ochraceous apical fasciae; mesonotum with two anterior oblique lines of white tomentum (often inconspicuous), and the scutello-mesothoracic suture usually white-fasciate; scopa white to creamy, largely dark on the sixth sternum, and a few dark hairs on the fifth laterally.

Male.—Size: Length 11-12 mm.; breadth of abdomen 3.5-4 mm.; anterior wing 7 mm.

Structure: Face about as broad as long; eyes subparallel; clypeal margin slightly emarginate medially; mandible 3-dentate, the middle tooth truncate, inferior projection median in position, triangularly acute; basal joint of flagellum subequal to pedicel, the second joint slightly longer, apical one dilated and flattened; lateral ocelli slightly nearer eyes than to edge of vertex; vertex nearly flat; cheeks subequal to eyes in breadth; coxal spines rather broad and flat, coxae with a patch of red bristles, otherwise bare anteriorly; front femora dilated apically, the inferior margin keeled apically; front tarsi dilated and flattened, the metatarsi excavated anteriorly, about as wide as their tibiae and about as long as the second to fourth joints combined; carina of sixth tergum broadly rounded, entire, apical margin of tergum with carinate median teeth which are nearer to the inconspicuous lateral teeth than to each other; seventh tergum broadly triangular.

Sternites: Apical presternal plates of fifth sternum poorly defined, closely united to the more basal portions of the plate, finely pubescent, the remainder of the presternite extensive, not at all linear medially, the medasternite entire medially (not emarginate basally), rather uniformly covered with fine setae, the basal marginal row of which are broadly dilated apically, the anterior margin with a median bicornate dense tuft of short setae, the poststernal strip outcurved on each side of this tuft; lateral portions of sixth presternite obliquely truncate apically, the medasternal areas separated medially, elongate, each with three or four indefinite rows of robust bristles which are abruptly flexed apically, the poststernal lobe short and broad, apical margin incurved, the lateral angles produced into tapering lobes.

Genital armature: Stipites moderately narrowed above base, dilated, obliquely compressed, and slightly sinuate apically, a restricted setose area near the tip dorsally; sagittae quite robust, slightly bowed, very slightly exceeding the tips of the stipites; volsellae triangularly acute.

Puncturation: Fine and close, almost crowded, on dorsum of thorax; yet more fine and close on cheeks and on abdomen basally, becoming somewhat more coarse to the fifth tergum; punctures slightly more widely separated on the shining vertex.

Color: Black; antennae dark brownish-red; front femora and tibiae ferruginous, the front tarsi ivory, without any black markings; mid and hind tibiae and tarsi dark ferruginous to piceous, the femora blackish; spurs yellow; tegulae yellowish-ferruginous; wings lightly infuscated, slightly darker apically, the nervures ferruginous.

Pubescence: Pale ochraceous on face and vertex, dense on face; whitish on cheeks, pleura, propodeum, mesonotum anteriorly, legs, and first, second and sixth abdominal segments; discs of mesonotum and third to fifth abdominal terga with dark brownish pubescence, the first to fifth terga with quite definite and entire whitish or ochraceous apical fasciae; tarsal fringes white, fuscous beneath on the front metatarsi, mid tarsal fringe long; coxal spines with long dense white pubescence posteriorly.

Type.—Male: Texas, [A.N.S.P., no. 2463].

Range.—New Jersey to Georgia, west to Texas, Kansas and Illinois, June to September. Definite records are as follows:

District of Columbia: 1 ♀, Rock Creek Park, Aug. 28, 1919, (J. C. Crawford; on *Strophostyles umbellata*).

Georgia: 1 ♀, Brunswick, June 1, 1922, (Mitchell).

Illinois: 1 ♂, 6 ♀, no locality record, (Hart no. 35530, on sand). 3 ♂, Meredosia, Aug. 19 & 22, 1917, (Sand pit).

New Jersey: 1 ♀, Riverton, June 29.

North Carolina: 2 ♂, Aberdeen, June 28, 1930. 14 ♂, 20 ♀, Carolina Beach, June 12, 1930, Aug. 10, 1932 and Sept. 12 & 13, 1931 & 1932, (on *Strophostyles*). 2 ♀, Hoffman, July 4, 1928. 1 ♂, Lumberton, June 22, 1928, (on *Koellia*). 13 ♀, Raleigh, Aug. 12 & 30, 1932, (on *Strophostyles*). 2 ♀, Tarheel, July 22, 1928, (on *Galactia*). 1 ♀, White Lake, July 22, 1928, (on *Galactia*). 8 ♂, 36 ♀, Wilmington, June 22 to Aug. 11, (on *Galactia*).

South Carolina: 1 ♂, 2 ♀, Georgetown, Aug. 1, 1934, (Mitchell).

Texas: 16 ♂, no locality record. 1 ♂, 2 ♀, Bexar County, Sept. 12 & 19, Oct. 2 (Parks). 8 ♂, 4 ♀, College Station, Aug. 11 to 31, 1919. Also identified from Fedor, Lee County, Palestine and Victoria.

Specimens of *integra* have also been identified from Harper and Medora County, Kansas, and from Bay Ridge, Maryland.

Flower records.—*Galactia* sp., *Pycnanthemum* sp., and *Strophostyles umbellata.*

Megachile (Xeromegachile) brimleyi Mitchell

(Pls. XXII and XXVI.)

Megachile brimleyi Mitchell, Trans. Am. Ent. Soc., LII, p. 114, 1926.

This species was originally described in the male sex only, but it was suspected that a female described under the name *integrella* was the same. Since that time the true female of *brimleyi*, which is not *integrella*, has been discovered and is described here for the first time.

Female.—Size: Length 12 mm.; breadth of abdomen 4 mm.; anterior wing 7 mm.

Structure: Face subquadrate; eyes subparallel; clypeal margin minutely denticulate, subentire; mandible 4-dentate, the third tooth truncate; basal joint of flagellum slightly longer than pedicel, second joint considerably shorter; lateral ocelli subequally distant from eyes and edge of vertex; vertex nearly flat; cheeks slightly narrower than eyes; hind metatarsi distinctly shorter and slightly narrower than their tibiae; abdomen rather more ovoid than cordate, apical margins of the terga depressed only toward sides, the sixth straight in profile and very nearly straight at sides in dorsal aspect.

Puncturation: Close and fine on cheeks above, on pleura, and on scutellum; slightly coarser and more definitely separated on mesonotum and on vertex medially, becoming more coarse and sparse on vertex laterally and on cheeks below; close but somewhat more coarse on clypeus; minute and very close on abdomen throughout, though the punctures become slightly more coarse on the fifth tergum; tegulae very minutely punctate.

Color: Black; antennae obscurely reddish beneath; tegulae dark anteriorly, more yellowish medially; wings faintly infuscated, darker apically, the nervures piceous to obscurely reddish; mid and hind spurs piceous, anterior ones more yellowish.

Pubescence: White on face, cheeks, thorax except dorsum, and basal abdominal segment; very short thin and dark on vertex, blacker and more dense, but very short, on mesonotum and scutellum; short, dense and black on discs of second to fifth abdominal terga, the sixth with a few short erect basal black hairs, the apical two-thirds covered with silvery tomentum and scattered erect silvery hairs, visible in profile; mesonotum with two oblique anterior lines of white tomentum, and the scutello-mesothoracic suture white-fasciate; first to fifth abdominal terga with narrow, but entire and conspicuous white apical fasciae; scopa white, black on the sixth sternum and across the apical margin of the fifth.

Male.—Size: Length 10-11 mm.; breadth of abdomen 3.5 mm.; anterior wing 7 mm.

Structure: Face longer than broad; eyes very slightly convergent below; clypeal margin entire; mandible 3-dentate, the inferior projection subbasal and acute; first and second joints of flagellum subequal, longer than the pedicel; lateral ocelli subequally distant from eyes and edge of vertex; vertex flat; cheeks hardly as broad as eyes; coxal spines flattened and triangular, about as long as broad at base, each with an anterior patch of red bristles; front femur broad medially, the inferior margin carinate; front tarsi slightly dilated, the metatarsus almost equalling the tibia in width and shallowly excavated anteriorly; abdomen subquadrate, carina of sixth tergum subentire, slightly depressed and either irregularly crenulate or somewhat pointed medially, apical margin of the tergum with carinate median teeth which are nearer the acute lateral teeth than to each other; seventh tergum barely visible, very broadly triangular.

Sternites: Apical presternal sclerites of fifth sternum extensive, rather sparsely covered with fine pubescence, median portion of the presternite not linear, the medasternite extensive, with a shortened truncate basal margin, very sparsely covered with fine setae, but those fringing the basal margin more robust and elongate, apically dilated, poststernal strip narrow, slightly incurved medially, with a median tuft of setae; lateral portions of sixth presternite vaguely defined, somewhat longer than broad, the medasternal areas obscurely defined also, more or less ovoid in outline, quite widely separated, very sparsely covered with sinuate setae, the poststernal lobe much broader than long, the lateral angles produced, acute.

Genital armature: Stipites constricted above base, sinuate and slightly dilated toward tips which bear numerous long hairs; sagittae moderately robust, about equalling the tips of the stipites; volsellae triangularly acute.

Puncturation: Fine and close on pleura and cheeks, the latter somewhat rugosely punctate; minute and close on abdomen basally, becoming slightly coarser and more definitely separated to the fifth tergum, but very fine and close on the sixth; relatively coarse and more widely separated on vertex, mesonotum and scutellum; tegulae very minutely punctate.

Color: Black; antennae more piceous; tegulae with a yellowish blotch medially; wings very faintly infuscated, darker apically, nervures piceous to reddish; antero-inferior face of front femur shining ferruginous, the posterior face black, upper face ferruginous medially; anterior and upper faces of front tibia blackish, the other face ferruginous; front tarsi pale yellow or ivory, narrowly margined with brownish beneath; spurs piceous to dark red.

Pubescence: White over entire head, on thorax except dorsum, and on basal abdominal segment, the mesonotum with short inconspicuous fuscous or blackish pubescence, and a few dark hairs on scutellum; second to fifth abdominal terga with short black pubescence, that on the sixth entirely white, thin above, dense below the carina; first to fifth terga with entire conspicuous white apical fasciae; mesonotum with two anterior oblique lines of white tomentum, and the scutello-mesothoracic suture white-fasciate.

Type.—Male: Wilmington, N. C., August 2, 1921, (Mitchell; on *Galactia volubilis*), [U.S.N.M., no. 29069].

Range.—The coastal region of North Carolina, July. In addition to the type series, the following specimens are now at hand: 3 ♂, 1 ♀, Wilmington, July 21, 1928, (Mitchell; on *Galactia*).

Flower records.—*Galactia volubilis.*

Megachile (Xeromegachile) parksi new species

This species is very similar to *integra* but can be immediately distinguished by the black scopa of segment five, this being pale in *integra*. *Integra* differs also in that the apical margin of the clypeus is more coarsely tuberculate, the punctures of the fifth and sixth abdominal segments are more fine and close, the punctures of the clypeus are more coarse and widely separated, and the anterior oblique lines of tomentum on the mesonotum and the fascia in the scutello-mesothoracic suture are more conspicuous.

Female.—Size: Length 13 mm.; breadth of abdomen 4.5 mm.; anterior wing 8 mm.

Structure: Face about as broad above as long, eyes slightly convergent below, clypeal margin slightly incurved, with a minute median denticle and one or two obscure ones on each side; mandible 4-dentate, cutting edge between two inner teeth; first joint of flagellum very slightly longer than pedicel or the second joint, lateral ocelli subequally distant from eyes and edge of vertex, vertex slightly rounded, cheeks slighly narrower than eyes, metatarsi slightly shorter and narrower than their tibiae; abdominal segments depressed or grooved across base, apical margins quite abruptly depressed except in middle, sixth tergum broadly rounded and nearly straight laterally in dorsal aspect, straight, with erect hair visible in profile,

Puncturation: Close and fine on face, cheeks and pleura above, more coarse but close on clypeus, more distinct and more widely separated on vertex and over most of mesonotum; becoming coarse and quite sparse on pleura below and sternum; minute and very close on scutellum and on the more basal abdominal segments, becoming more coarse and distinct to the fifth segment, minute and crowded on sixth.

Color: Black; antennae reddish-piceous; tegulae and wing nervures piceous; anterior spurs yellowish, posterior spurs piceous; wings subhyaline, clouded apically.

Pubescence: White on face, clypeus, cheeks, pleura, propodeum, sternum, legs, and basal segment of abdomen; short and thin but mostly pale on vertex; short and thin on mesonotum and scutellum, with intermixed light and dark hairs, more pale on mesonotum anteriorly and scutellum posteriorly; very short and black on discs of abdominal segments 2 to 5 and at base of sixth, the sixth with silvery appressed tomentum over apical half; segments one to five with entire white apical fasciae, the basal one rather narrow; scopa white, entirely black on fifth and sixth segments, front tarsi with a dense brush of reddish brown bristles anteriorly, posteriorly with a thin but rather long fringe of mixed light and dark hairs, mid metatarsi clothed on outer face with dense silvery pubescence, beneath with a reddish-brown brush.

Type.—Female: Bexar County, Texas, May 18, 1934, (H. B. Parks).

Paratypes.—2 ♀, topotypical, May 6 and 18, 1934. 1 ♀, no locality record; (all Parks).

Megachile (Xeromegachile) victoriana Mitchell (Pl. XXV.)

Megachile (*Xeromegachile*) *victoriana* Mitchell, Trans. Am. Ent. Soc., LIX, p. 315, 1934.

The sternites and genital armature alone remain to be described.

Sternites: Lateral portions of fifth presternite considerably broader than long, apical sclerites irregularly rounded, rather sparsely covered with short fine pubescence, median portion of presternite not at all linear, the medasternite about twice as broad as long, sparsely set with short setae, the apical ones simple, very fine and obscure, the more basal ones broadly dilated and flattened apically, the basal fringe of setae broadly spatulate, the poststernal strip outcurved on each side of middle, with a small median pencil of short setae; lateral portions of sixth presternite longer than broad, but not sharply delimited from the rest of the sternum, medasternal areas restricted, distinctly separated, with three or four transverse rows of robust apically flexed setae, each area terminated laterally by a curved bare carina, the poststernal lobe small, lateral angles produced into elongate slender acute lobes.

Genital armature: Stipites slightly narrowed above base, slightly sinuate and obliquely compressed apically, tips subacute, the dorsal inner surface apically with a few scattered short setae; sagittae robust, tips slightly dilated and slightly exceeding tips of stipites; volsellae rather robust, triangulary pointed apically.

Type.—Male; Victoria, Texas, April 27, 1907, (J. D. Mitchell), [U.S.N.M., no. 44244].

This is a unique specimen.

Megachile (Xeromegachile) casadae Cockerell
(Pls. XXII and XXIV.)

Megachile casadae Cockerell, Ann. Mag. Nat. Hist., (7), I, p. 127, 1898. Cockerell. Denison Univ. Bull., XI, p. 65, 1898. Cockerell, Entomologist, XXXII, p. 158, 1899. Cockerell, Ann. Mag. Nat. Hist., (7) VI, p. 12, 1900.
Megachile populi Cockerell, Ann. Mag. Nat. Hist., (7), VI, p. 17, 1900. Cockerell, Ann. Mag. Nat. Hist., (8), I, p. 265, 1908.
Megachile opuntiarum Cockerell, Ann. Mag. Nat. Hist., (7), XVII, p. 229, 1906. Cockerell, Univ. Colo. Stud., IV, No. 4, p. 254, 1907.
Megachile austinensis Mitchell, Psyche, XXXIV, p. 105, 1927.

The fact that specimens of *casadae* males and *populi* females are commonly found bearing the same collection data, and that they bear considerable resemblance to each other in puncturation and color of pubescence has led me to the quite positive opinion that they are the same, hence they are so treated here. Since the third and fourth references in the bibliography of *casadae* refer to the female, however, it seems rather doubtful that the author had the true female before him at that time.

The female is somewhat variable as to color of pubescence, and it is now evident that *austinensis* is a synonym. It differs from the typical form in having black hairs on the second and sixth terga, (these being entirely pale pubescent in the type of populi) and there are a few black hairs laterally in the scopa of the fifth sternum.

That the male also is somewhat variable is indicated by the specimen from South Dakota in which the antennae, labrum, front femora and tibiae are ferruginous in large part, with dark ferruginous mid and hind legs, and with no dark pubescence on the abdomen.

Female.—Size: Length 12-13 mm.; breadth of abdomen 4.5 mm.; anterior wing 9 mm.

Structure: Face about as long as broad: eyes subparallel; clypeal margin straight, with a pitted impressed line just above the margin; mandible 4-dentate, all the teeth acute; second joint of flagellum subequal to pedicel, the first joint considerably longer; lateral ocelli subequally distant from eyes and edge of vertex; vertex nearly flat; cheeks slightly broader than eyes; metatarsi distinctly shorter and narrower than their tibiae; abdomen cordate, second to fifth terga rather deeply depressed basally and apically, the sixth straight in profile, very nearly straight at sides in dorsal aspect, with numerous short but erect hairs visible toward the base in profile.

Puncturation: Fine and close on cheeks and pleura; rather widely separated on mesonotum medially and vertex laterally, closer on vertex medially and mesonotum laterally and anteriorly, as also on scutellum; minute and widely scattered on the polished clypeus which is almost impunctate medially; minute and close on abdomen basally, becoming slightly more coarse and sparse on the fifth tergum.

Color: Black; antennae and tegulae more piceous; wings subhyaline, slightly clouded apically, the nervures piceous to pale brownish; spurs pale brownish.

Pubescence: White on head, but vertex with short inconspicuous dark hairs intermixed with longer white ones; white on thorax except for a small amount of dark pubescence on disc of mesonotum posteriorly; third to fifth abdominal terga with blackish pubescence, that on the fifth more conspicuous, and the sixth with either blackish or pale erect hairs toward the base, with silvery tomentum apically, this becoming brownish at extreme tip; first to fifth terga with entire white apical fasciae, that on the first narrow, the others broad dense and conspicuous; dorsum of thorax without lines or fasciae of tomentum; scopa white, fuscous on sixth sternite.

Male.—Size: Length 10-12 mm.; breadth of abdomen 4 mm.; anterior wing 7.5 mm.

Structure: Face about as long as broad; eyes subparallel; clypeal margin straight; mandible 3-dentate, inferior projection subbasal; labrum more or less concave medially at base; basal joint of flagellum slightly longer than pedicel, the second subequal to the first, the apical one flattened and somewhat dilated; lateral ocelli subequally distant from eyes and edge of vertex; vertex slightly rounded, but the hind margin incurved as usual; cheeks broader than eyes; coxal spines slightly longer than broad at base, coxa with a dense patch of short red bristles; front femur dilated apically, the inferior margin conspicuously keeled; front tarsi dilated, but not equalling their tibiae in width, the anterior margin of the metatarsus shallowly excavated; abdominal terga moderately depressed basally and apically; carina of sixth tergum broadly and irregularly triangular, with small irregular crenulations, surface of the disc depressed basad of the carina, apical margin of the tergum with carinate median teeth which are much nearer the obscure lateral teeth than to each other; seventh tergum conspicuous, produced into a short median spine.

Sternites: Apical presternal sclerites of fifth sternum only partially delimited, quite densely pubescent, median portion of presternite not linear, the medasternite undivided, uniformly covered with short dilated setae, the poststernal strip nearly straight, with a median tuft of short setae;

lateral portions of sixth presternite longer than broad, the medasternal areas extensive, quite widely separated, carinate apically and covered with short robust and slightly sinuate setae, the poststernal lobe short and broad, its lateral angles considerably produced.

Genital armature: Stipites narrowed above base, gradually dilated toward the tips, slightly sinuate, with a small apical hair tuft and a ventral subapical minutely setose area; sagittae robust, slightly exceeding the stipites; volsellae obliquely truncate.

Puncturation: Close and fine on cheeks and pleura; more distinctly separated on vertex; rather sparse in center of mesonotum, but close laterally and anteriorly; minute and close on abdomen basally, becoming more course and sparse to the fifth tergum; minute and rather close, but not crowded on the shining surface of the sixth tergum basally. the carina more or less rugose.

Color: Black, including antennae; tegulae more piceous; wings subhyaline, slightly clouded apically, the nervures piceous to brownish; front femur ferruginous on anterior and upper faces, dark on the margin between them and over most of the posterior face; front tibia dark on outer face except apex, otherwise ferruginous; front tarsi ivory, blackened beneath posteriorly; mid and hind legs dark, the tarsi more or less ferruginous, the spurs yellowish-brown.

Pubescence: Entirely white except for inconspicuous dark hairs on vertex, disc of mesonotum medially, and discs of the third to fifth abdominal terga; front tarsal fringes white, blackish at extreme base, and golden brown beneath; mid tarsal fringe entirely white, long and conspicuous.

Type.—Male; Las Cruces, N. M., [Cockerell].

Range.—Wyoming and South Dakota, south to New Mexico and Texas. Definite records are as follows:

COLORADO: 2♂, Boulder, July 5, 1935, (C. D. Michener, on *Opuntia*). 6♂, 5♀, Boulder County, June 1925, (C. P. Custer). 3♂, 3♀, Boulder County, June 7, 1925, (C. H. Hicks). 2♂, 2♀, Colorado Springs, June 15-30, 1896, 6,000-7,000 ft., (H. F. Wickham). 1♂, Trinidad, June 12, 1919. 1♂, Zimmermans, Aug. 26, 1935, (Figgins). Identified also from Spring Canyon, vic. Fort Collins and from Windr. Junc., Rocky Mountain National Park.

NEBRASKA: 1♂, War Bonnet Canyon, Sioux County, June 26, 1901. (J. C. Crawford; on *Helianthus*).

NEW MEXICO: 1♂, Pecos, June 30, (Cockerell).

SOUTH DAKOTA: 1♂, Volga.

TEXAS: 1♀, Bexar County, June 10, 1933, (Parks). 1♂, Eastland County, May 7, 1921, (Grace O. Wiley).

UTAH: 1♂, Zion National Park, (Vasco M. Tanner).

WYOMING: 1♂, Newcastle, June, (M. Cary).

Flower records.—Helianthus, Opuntia and *Populus.*

Megachile (Xeromegachile) palmensis Mitchell (Pl. XXIV.)

Megachile (Xeromegachile) palmensis Mitchell, Trans. Am. Ent. Soc., LIX, p. 317, 1934.

Megachile (Xeromegachile) smithi Mitchell, Trans. Am. Ent. Soc., LIX, p. 337, 1934.

This species is a close affinity of *casadae,* differing chiefly in the more minutely and sparsely punctate abdomen and in the fact that the lateral ocelli are slightly nearer the edge of the vertex than to the eyes in both sexes. The female was described under the name *smithi.* The sternites and genital armature have not been described.

Sternites: Lateral portions of fifth presternite about as long as broad, median portion not linear, apical sclerites somewhat rounded apically, well covered with rather coarse pubescence, the medasternite quite extensive, its basal margin slightly incised medially, uniformly covered with short setae, the apical ones simple, the more basal ones dilated apically, the poststernal strip straight, with a small median tuft of setae; lateral portions of sixth presternite longer than broad, the medasternal areas rather extensive, separated medially, rather sparsely set with short and rather robust setae which are slightly dilated and flexed apically, the posternal lobe rather large, lateral angles produced into slender acute lobes.

Genital armature: Stipites somewhat narrowed above base, gradually dilated apically, the apex obliquely compressed and with an oblique truncation, a few inconspicuous hairs on outer margin of tip, otherwise bare; sagittae robust, slightly bowed, slightly exceeding the stipites; volsellae robust, truncate apically.

Type.—Male; Palm Springs, California, March 25, 1916, (C. L. Fox). [Calif. Ac. Sc., no. 3616].

The type of *smithi* (female) bears the following data; Palm Springs Canyon, California, March 9, 1924, (H. S. Smith), [received from Timberlake; U.S.N.M., no. 44248]. The number of topotypical male paratypes is four instead of two, as stated in the original description.

Range.—California. One additional pair of specimens is to be recorded as follows: 1 ♂, 1 ♀, Palm Canyon, March 25, 1935, (Timberlake; on *Sphaeralcea rosacea*).

Flower records.—*Sphaeralcea rosacea.*

Megachile (Xeromegachile) dulciana Mitchell

Megachile (*Xeromegachile*) *dulciana* Mitchell, Trans. Am. Ent. Soc., LIX, p. 343, 1934.

This species was fully described in Part 1 of this revision.

Type.—Female; San Diego County, California, April, (Coquillett), [U.S.N.M., no. 44250].

This is a unique specimen.

Megachile (Xeromegachile) manifesta Cresson (Pl. XXIV.)

Megachile manifesta Cresson, Trans. Am. Ent. Soc., VII, p. 122, 1878. Cockerell, Ann. Mag. Nat. Hist., (7), VI, p. 13, 1900. Cockerell, Univ. Colo. Stud., IV, No. 4, p. 254, 1907. Friese, Das Tierr. Lfg. 28, Apidae I, p. 240, 1911. Cresson, Mem. Am. Ent. Soc., I, p. 122, 1916. Mitchell, Psyche, XXXIV, p. 112, 1927.

Megachile chrysothamni Cockerell, Ann. Mag. Nat. Hist., (8), I, p. 262, 1908. Mitchell, Psyche, XXXIV, p. 108, 1927.

This species is very closely related to both *wheeleri* and *nevadensis,* but the males can be distinguished easily from both of these by the absence of spines or carinae just posterior to the front coxae on the anterior margin of the mesosternum. The female, originally described under the name *chrysothamni*, differs from both of these chiefly in the degree of density of the punctures on the mesonotum and more apical abdominal segments, these being almost crowded on the mesonotum, and relatively close on the abdomen.

Female.—Size; length 11-12 mm.; breadth of abdomen 4 mm.; anterior wing 8 mm.

Structure: Face slightly broader than long; eyes subparallel; clypeal margin straight, shining, slightly impressed just above the edge; mandible 4-dentate; basal joint of flagellum slightly longer than pedicel, the second joint slightly shorter; lateral ocelli subequally distant from eyes and edge of vertex; vertex flat; cheeks subequal in width to eyes; hind metatarsi distinctly shorter and narrower than their tibiae; abdomen more or less ovoid, the more apical terga only very slightly depressed basally, somewhat more deeply so apically; sixth tergum in dorsal aspect only slightly concave at sides, rounded apically, straight in profile, with abundant erect hair visible.

Puncturation: Very fine and close on clypeus above, more coarse and more distinctly separated below; fine and close on vertex; shallow on cheeks; very close on thorax, somewhat more coarse but close on mesonotum; minute and crowded on basal abdominal segments, becoming more distinct but still quite close on the more apical terga, fine and crowded on the sixth.

Color: Black; antennae and tegulae more piceous; wings subhyaline, slightly clouded apically, the nervures piceous; spurs yellow.

Pubescence: White on face, cheeks, pleura, propodeum, scutellum, legs, and first abdominal segment; fuscous on vertex and on mesonotum except anteriorly; second to sixth abdominal terga with erect blackish pubescence, the sixth with silvery tomentum apically, second to the fifth with entire white apical fasciae, these narrower on the more basal terga, broad, dense and conspicuous on the more apical ones; scopa white, with a few apical dark hairs on the sixth sternum.

Male.—Size: Length 11-12 mm.; breadth of abdomen 3.5-4 mm.; anterior wing 7.5 mm.

Structure: Face about as broad as long; eyes subparallel; clypeal margin straight; mandible 3-dentate, the inferior projection very robust, subbasal; first and second joints of flagellum subequal, slightly longer than pedicel, the apical one flattened and somewhat dilated; lateral ocelli subequally distant from eyes and edge of vertex; vertex flat; cheeks subequal to eyes in width; coxal spines very broad and flat, spatula-like, slightly bowed cephalad, the surface of the coxa polished, with neither setae nor pubescence; front femora widely dilated, the lower margin distinctly bisinuate basally; front tarsi dilated, the metatarsus basally, however, narrower than the tibia, expanded apically, the anterior margin deeply excavated, the resulting scale protruding nearly to the tip of the second joint; mesosternum neither carinate nor spined anteriorly; hind metatarsi subequal to second to fourth joints combined, much longer than wide, the middle joints somewhat rectangular, the apical one relatively slender; abdomen strongly convex above, the terga only slightly depressed basally, but quite strongly so apically; carina of sixth tergum with fine irregular denticulations, slightly angled medially, apical margin of the tergum with the carinate median teeth much nearer the insignificant lateral teeth than to each other; seventh tergum robust, produced medially into a short spine-like projection.

Sternites: Apical presternal plates of fifth sternum subtriangular, finely pubescent, located between the medasternite and the tips of the long and narrow lateral portions of the presternite, the median portion of which is linear, and with a long acute spine-like median projection, the medasternite almost completely divided into two more or less rectangular pieces which are uniformly covered with fine simple setae, the poststernal strip broadly outcurved, with a small median tuft of fine setae; lateral portions of sixth presternite elongate, narrow, the medasternal areas widely separated medially, broader medially, more linear laterally, densely covered with rather robust setae the tips of which are abruptly flexed, the poststernal lobe short and broad, the lateral angles produced into broad wing-like lobes, apical margin between these slightly outcurved and pubescent.

Genital armature: Stipites but slightly constricted above base, very slightly sinuate, the tips somewhat dilated and densely covered on the inner surfaces with rather long pubescence; sagittae more slender, narrowed apically, the tips not exceeding the stipites; volsellae obscurely triangular, the tips rounded.

Puncturation: Fine and close on head and thorax; minute and close on basal abdominal segments, becoming slightly more coarse and sparse to the fifth tergum, the more apical terga shining, the sixth more coarsely punctate.

Color: Black; antennae and tegulae more piceous; wings subhyaline, slightly clouded apically, the nervures yellowish-brown; anterior face of front femur and posterior face of front tibia with polished yellowish-ferruginous areas, these joints otherwise dark; front tarsi pale yellow, the posterior margin beneath with some brownish areas; mid and hind legs dark, the spurs yellow.

Pubescence: Pale ocraceous above, fading to white below, with no dark admixture; tarsal fringes white, the front ones tipped with fuscous, yellowish-brown beneath; second to fifth abdominal terga with entire whitish apical fasciae.

Type.—Male: Colorado, [A.N.S.P., no. 2466].

Range.—Alberta, Montana and North Dakota, southward to Arizona and New Mexico. Definite records are as follows:

ARIZONA: 1♀, East Verde River, 4500 ft. Identified also from Flagstaff, Oak Creek Canyon and Santa Rita Mts.

COLORADO: 4♂, 1♀, no locality record, (C. F. Baker). 1♀, Boulder, Aug. 24, (S. A. Rohwer; on *Grindelia*). 1♂, Boulder, Aug. 20, 1935, (C. D. Michener; on *Helianthus*). 26♂, 21♀, Boulder, July 25 to Sept. 18. 1♀, Denver, Aug. 28, 1900. 1♂, 1♀, Denver, Aug. 6, 1908, (Bennett). Identified also from Bear Creek, Estes Park, Geneva Park, Gregory Canyon and Roggen.

MONTANA: 1♂, 1♀, no locality record. Identified from Bozeman, Gallatin County and Miles City.

NEBRASKA: 4♂, Glen, Sioux County, Aug. 15 & 20, 1905 & 1906. 1♂, Monroe Canyon, Aug. 19, 1912.

NEW MEXICO: 1♂, 2♀, Albuquerque, Sep. 1-3, 1935, (C. D. Michener; on *Grindelia*). 1♂, Fort Wingate, Sept. 15, 1908 (John Woodgate). Identified also from Estancia and Torrence County.

NORTH DAKOTA: 3♂, 5♀, Beach, Aug. 3-25, 1921 & 1924, (C. N. Ainslie, on *Grindelia*). 1♀, Dickinson, (C. N. Ainslie). Identified also from Sentinel Butte.

WYOMING: 1♂, Uva, Aug. 3, 1926, (Ruth K. Hicks).

Specimens of *manifesta* have also been identified from Calgary, Alberta and Sierra Nevada, California.

Flower records.—*Cleome* sp., *Helianthus* sp., *Grindelia squarrosa* and *Gutierrezia sarothrae.*

Megachile (Xeromegachile) wheeleri Mitchell

(Pls. XXII and XXIV.)

Megachile vernonensis (female) Cockerell, Can. Ent., xliv, p. 355, 1912.
Megachine wheeleri Mitchell, Psyche, xxxiv, p. 107, 1927.
Megachile spokanensis Mitchell, Psyche, xxxiv, p. 109, 1927.

The male of *wheeleri* was described under the name *spokanensis,* the relationship of the two sexes not being established at the time they were first discovered. The evidence, both from the collecting data and the close affinities, indicates quite positively, however, that the two are the same.

The females seem to be quite variable as to the amount of black in the scopa, as there is at hand a series from Crater Lake Park, Oregon, in part of which the scopa is entirely black on both the fifth and sixth sterna, while in the remainder of the series it is in part white on the fifth. A series of typical males accompanied these females. Another series from Humboldt County, California, collected on sand dunes, also has the scopa entirely black on the fifth and sixth sterna, and there are a few short dark hairs on the upper part of the clypeus. In this series, the black pubescence of the vertex, mesonotum and third to sixth terga is relatively long and conspicuous, and the specimens appear somewhat more robust, with an abdominal width of 4.5 mm. The males in this series are slightly larger (13 mm.) than the typical forms and the pubescence is conspicuously ochraceous, but there are no other definite differences, even of the genitalia and hidden sternites.

It is evident that Cockerell had a specimen of this variant of *wheeleri* before him when he described the female of *vernonensis,* as it answers to the description of *vernonensis* perfectly, and a specimen has been compared with the type in the British Museum by Dr. O. W. Richards and found to be the same. The name *vernonensis* cannot be used, however, because of the fact that the male was made the type, and is synonymous with *texana* (in *Litomegachile*).

Female.—Size; Length 12-13 mm.; breadth of abdomen 4 mm.; anterior wing 8 mm.

Structure: Face about as broad as long; eyes subparallel; clypeal margin straight, shining, slightly impressed just above edge; mandible 4-dentate; basal joint of flagellum slightly longer than pedicel, the second joint slightly shorter; lateral ocelli slightly nearer edge of vertex than to eyes; vertex flat; cheeks subequal in width to eyes; hind metatarsi slightly narrower and distinctly shorter than their tibiae; abdomen more or less ovoid, the more apical terga only very slightly depressed basally, somewhat more deeply depressed apically; sixth tergum slightly concave at sides in dorsal aspect, rounded apically, straight in profile, with abundant erect hair visible.

Puncturation: Quite close and fine on clypeus, vertex medially, cheeks, and most of thorax, shallow on cheeks; slightly more coarse and sparse on vertex laterally, more coarse and distinctly separated in center of mesonotum; very minute and close, almost indistinguishable, on abdomen basally, becoming quite sparse, but still minute, to the polished fifth tergum, fine and close on the sixth.

Color: Black; antennae more piceous beneath; tegulae ferruginous; wings subhyaline, slightly clouded apically, the nervures piceous; spurs yellow.

Pubescence: White on face, cheeks, pleura, propodeum, legs, and on first two abdominal segments; intermixed white and fuscous on vertex; fuscous in large part on mesonotum, the scutellum with usually a few scattered dark hairs in the otherwise white pubescence; black on third to sixth abdominal terga, longer on the more apical terga, the sixth with silvery tomentum apically, the second to the fifth with entire white apical fasciae, narrow on the more basal terga, but broad, dense and conspicuous on the more apical ones; scopa white, black on the sixth sternum, with a few apical black hairs on the fifth, or with the fifth entirely black.

Male.—Size: Length 10-11 mm.; breadth of abdomen 3.5 mm.; anterior wing 7.5 mm.

Structure: Face about as broad as long; eyes subparallel; clypeal margin straight; mandible 3-dentate, the inferior projection very robust, subbasal; basal joint of flagellum subequal to pedicel, the second joint very slightly longer, apical one flattened and considerably dilated; lateral ocelli subequally distant from eyes and edge of vertex; vertex flat; cheeks slightly broader than eyes; coxal spines very broad and flat, spatula-like, slightly bowed cephalad, the surface of the coxa polished, with neither setae nor pubescence; front femur widely dilated, the inferior margin distinctly bisinuate basally; front tarsi dilated, the metatarsus basally, however, narrower than the tibia, but expanded apically, the anterior margin deeply excavated, the resulting scale protruding almost to the tip of the second joint; middle joints of hind tarsi squarish, the apical one considerably thickened, the metatarsus short, subequal to the second and third joints combined; mesosternum with a flattened, carina-like spine just posterior to each front coxa; abdomen strongly convex above, the terga only slightly depressed basally, but quite strongly so apically; carina of sixth tergum with coarse and irregular denticulations, apical margin of the tergum with carinate median teeth which are much nearer the obscure lateral angles than to each other; seventh tergum robust, produced medially into a short triangular projection.

Sternites: Apical presternal plates of fifth sternum small, subtriangular, very finely pubescent, located between the medasternite and the tips of the long narrow lateral portions of the presternite, the median portion of which is long linear and with a long spine-like median projection, the medasternite almost divided into two parts, each of which is rounded basally, straight apically and quite uniformly covered with fine simple setae, the poststernal strip broadly outcurved and with a dense median tuft of fine setae; lateral portions of sixth presternite narrow and elongate, the medasternal areas widely separated, broader medially than laterally, densely covered with long robust setae, those toward the middle of the plate with abruptly flexed tips, the poststernal lobe broad and short, the lateral angles produced into prominent apically directed wing-like lobes, appearing therefore to be broadly and deeply emarginate.

Genital armature: Stipites but slightly constricted above base, very slightly sinuate, somewhat dilated and densily covered on the inner surfaces with long pubescence apically, the tips slightly bowed medially; sagittae slender, relatively straight, the tips not exceeding the stipites; volsellae rounded or obscurely triangular with rounded tips.

Puncturation: Fine and close over entire head and thorax; minute and close on abdomen basally, becoming slightly more coarse and sparse to the fifth tergum, the more apical terga shining, the sixth more coarsely punctate.

Color: Black; antennae piceous-red beneath; tegulae dark ferruginous; wings subhyaline, slightly clouded apically, the nervures piceous; anterior face of front femur and posterior face of front tibia polished yellowish-ferruginous, these leg joints otherwise dark; front tarsi pale yellow, margined posteriorly beneath with fuscous; mid and hind legs dark, the apical tarsal joints more or less ferruginous; spurs yellow.

Pubescence: Entirely yellowish-white, with no dark admixture; tarsal fringes white, the front ones tipped with fuscous, and yellowish-brown beneath; second to fifth abdominal terga with entire whitish apical fasciae.

Type.—Female: Alta Meadow, California, 9000 feet, August 23, 1917, (W. M. Wheeler), [M. C. Z., no. 15708].

Range.—Colorado to California, north to British Columbia, Alberta and Saskatchewan, July, August and September. Definite records include the following:

ALBERTA: 1♂, Brant, Aug. 5, 1921, (E. H. Strickland). 1♂, Lethbridge, Aug. 27, 1916, (Sladen; on *Chrysopsis*). 1♂, Medicine Hat, Aug. 20, 1916, (Sladen). 2♂, 4♀, Oven, Aug. 24, 1931, (O. Peck). 1♂, Redcliffe, Aug. 1, 1917, (Sladen; on *Alfalfa*). Identified also from Calgary.

CALIFORNIA: 2♀, Danner Lake, Placer County, Aug. 24, 1916 (L. Bruner). 1♂, Florence L., Fresno County, July 1930, (C. D. Michener). Identified also from Giant Forest, Phillips and Plumas County.

COLORADO: 7♂, Creede, Aug. 1914, (S. J. Hunter). 4♂, Meeker, July 20-21, 1919. Identified also from Aspen and Tennessee Pass.

MONTANA: 1♂, Three Forks, Aug. 1, 1918, (A. L. Melander). Identified also from Helena, Missoula and Pondera County.

NEVADA: 3♂, no locality record.

NORTH DAKOTA: 2♂, Bottineau, Aug. 19, 1923, (C. N. Ainslie). 1♂, Washburn, July 23, 1926, (O. A. Stevens; on *Lygodesmia juneae*). 1♂, Williston, Aug. 9, 1915, (O. A. Stevens; on *Grindelia squarrosa*). Identified also from Edgeley and McKenzie.

OREGON: 1♀, no locality record. 1♀, Anthony to Crawfish Lake, Blue Mts., 7100-7700 ft., Aug. 4, 1929. 1♂, Anthony-Dutchflat trail, 7100-7850 ft., Blue Mts., Aug. 8, 1929, (Scullen). 4♂, 7♀, Antelope Mt., Harney County, 6500 ft., Aug. 7-22, 1931, (D. K. Frewing). 1♂, Chemult, 4700 ft., Aug. 10, 1935, (Ferguson). 1♂, Cloud Cap Inn, Cooper's Spur, Mt. Hood, 6000 ft., Aug. 19, 1927, (Scullen). 18♂, 23♀, Crater Lake, 6000-6600 ft., Aug. 4-22, 1930, (Scullen). 17♂, 9♀, Crater Lake Park, Pole Bridge Meadow, 5900 ft., Aug. 11, 1935, (Scullen and Ferguson). 2♂, 1♀, five miles north of Ft. Klamath, 4400 ft., Aug. 11, 1935, (Scullen and Ferguson). 4♂, 6♀, Lake of woods, Klamath County, 4950 ft., Aug. 12, 1935, (Scullen and Ferguson). 1♀, Prairie City, 3520 ft., Aug. 12, 1929, (Scullen, on *Solidago*).

SASKATCHEWAN: 1♀, Swift Current, Aug. 23, 1916, (Sladen).

UTAH: 1♀, Ogden, Aug. 29-30, 1916. Identified also from Huntsville.

WYOMING: 1♀, Jackson, July 13-17, 1920. Identified also from Carbon County and Rock River.

Specimens of *wheeleri* have also been identified from Nicola and Vernon, British Columbia.

Flower records.—*Grindelia squarrosa, Lygodesmia juneae* (?), yellow aster sp., *Chrysopsis* sp., *Chrysothamnus* sp., *Solidago* sp., and alfalfa.

Megachile (Xeromegachile) nevadensis Cresson

(Pls. XXII and XXIV.)

Megachile nevadensis Cresson, Trans. Am. Ent. Soc., VII, p. 209, 1879. Friese, Das Tierr. Lfg. 28, Apidae I, p. 242, 1911. Cresson, Mem. Am. Ent. Soc., I, p. 125, 1916.

This species is close to both *wheeleri* (*spokanensis*) and *manifesta* (*chrysothamni*). The males of these three species are readily separated by the presence or absence of the carinate mesosternal spines posterior to the front coxae and the patch of red bristles on the anterior face of the front coxa. *Nevadensis* has both the mesosternal spines and the coxal bristles, while both are lacking in *manifesta* and the red bristles are lacking in *spokanensis*. A careful check of other characters will reveal other less conspicuous differences, also. The females, however, are much more difficult to distinguish, although *nevadensis* is usually larger and much more ochraceous pubescent than the other two species. Color and size are both such variable factors, however, that they can scarcely be relied upon safely, and the puncturation should be carefully checked in determination of these three.

Female.—Size: Length 12-13 mm.; breadth of abdomen 5 mm.; anterior wing 10 mm.

Structure: Face about as broad as long; eyes subparallel; clypeal margin entire; mandible 4-dentate; second joint of flagellum subequal to pedicel, the first joint considerably longer; lateral ocelli subequally distant from eyes and edge of vertex; vertex flat; cheeks slightly broader than eyes; hind metatarsi slightly narrower and distinctly shorter than their tibiae; abdomen broadly cordate, the terga but slightly depressed basally and apically, the sixth straight laterally, in dorsal aspect, straight in profile with abundant erect hair visible.

Puncturation: Close and fine on clypeus, cheeks, pleura, propodeum and scutellum as also on vertex medially; somewhat more coarse and more widely separated on vertex laterally; relatively coarse but close on mesonotum; very fine and densely crowded on basal abdominal terga, becoming relatively widely separated to the fifth tergum where the surface is shining, but fine and close on the sixth.

Color: Black; antennae below and tegulae obscurely reddish or fuscous; wings subhyaline, slightly clouded apically, the nervures fuscous to pale yellowish-brown; spurs yellowish-brown.

Pubescence: Pale ochraceous to whitish on face, cheeks, thorax laterally and beneath, and on the first two abdominal segments; long and fuscous on vertex, shorter and fuscous or black on mesonotum and on third to fifth abdominal terga; scutellum with intermixed fuscous and pale hairs; sixth tergum with pale tomentum and erect and rather long blackish hairs; first to fifth terga with entire ochraceous or whitish apical fasciae, narrow on the first and second, broad and conspicuous on the others; scopa pale ochraceous or whitish, blackish on the sixth sternum.

Male.—Size: Length 12-13 mm.; breadth of abdomen 4.5 mm.; anterior wing 9 mm.

Structure: Face about as broad as long; eyes subparallel; clypeal margin slightly emarginate medially; mandible 3-dentate, inferior projection robust, subbasal; basal joint of flagellum considerably longer than pedicel, slightly longer than the second joint, the apical one broadly dilated and flattened; lateral ocelli slightly nearer eyes than to edge of vertex; vertex nearly flat; cheeks considerably broader than eyes; coxal spines robust, flattened, broad basally, acute at tips, each coxa with a dense patch of reddish bristles in front of the spine; front femur strongly dilated apically, the inferior margin with a pronounced keel; front tarsi dilated, subequal in width to their tibiae, the metatarsus subequal in length to the second to fourth joints combined, rather deeply excavated anteriorly, and the apex considerably produced over the second joint; mesosternum with a carina-like projection or spine immediately posterior to each front coxa; abdomen rather parallel-sided, the terga slightly depressed basally, considerably depressed apically; carina of sixth tergum not emarginate medially, but very irregularly spinose or deeply irregularly serrate, apical margin of the tergum with carinate median teeth which are much nearer the inconspicuous lateral teeth than to each other; seventh tergum conspicuous, produced medially into a slender spine.

Sternites: Apical presternal plates of fifth sternum obscurely ovate, with mere traces of pubescence located between the medasternite and the triangular lateral portions of the presternite, the median portion of which is nearly linear and with a long median acute projection, the medasternite deeply emarginate medially on the basal margin, practically dividing the plate into two halves, these quite uniformly covered with fine simple setae, the poststernal strip slightly outcurved on each side of middle, where there is located a small tuft of fine pubescence; lateral portions of sixth presternite much longer than broad, the medasternal areas, separated medially for about the width of the poststernal lobe, elongate, bearing long slender setae, those toward the center slightly flexed apically, the others simple, the poststernal lobe broader than long, apical margin outcurved and slightly pubescent medially, lateral angles produced into elongate acute lobes.

Genital armature: Stipites narrowed above base, compressed, broadly dilated and obliquely truncate apically, the inner apical face of each covered with very long coarse pubescence; sagittae robust, relatively straight except for the slightly flexed tips, barely exceeding the tips of the stipites; volsellae triangular, with rounded tips.

Puncturation: Fine and quite close, but rather shallow on the shining cheeks and vertex; minute and dense on pleura; somewhat more coarse but very close on mesonotum, more distinctly separated on the scutellum; fine and close on basal abdominal tergum, becoming increasingly sparse to the shining fifth tergum, irregular on the sixth.

Color: Black; antennae more piceous; tegulae dark ferruginous; wings subhyaline, somewhat darker apically, the nervures piceous to obscure reddish; front femur ferruginous on upper face, blackish on posterior face, the anterior one polished, yellowish medially, darker along the margins; front tibia black on outer face, dark red on the other two faces; front tarsi yellow, second and third joints each with a dark spot beneath; mid and hind legs dark, the spurs yellowish.

Pubescence: Entirely pale ochraceous, without black admixture; front tarsal fringes brownish, white basally; mid tarsal fringes white, long and conspicuous; second to fifth abdominal terga with entire ocraceous or whitish apical fasciae.

Type.—Male; Nevada, [A.N.S.P., no. 2468].

Range.—Oregon to Wyoming, south to California, Arizona and New Mexico. August and September. Definite records include the following:

CALIFORNIA: 1♀, Portola, Sept. 5, 1917, (R. C. Shannon). 2♀, Riverside, Sept. 25, 1926 and Sept. 18, 1927, (Timberlake). 3♀, Sacramento, Sept. 27, 1916, (L. Bruner). 1♀, Whitewater, Riverside County, Oct. 27, 1934, (Michener; on *Isocoma veneta* var. *acradenia*). Identified also from Sierra Nevada and Mt. Shasta.

NEVADA: 20♂, 21♀, no locality record.

NEW MEXICO: 2♂, Fort Wingate, Sept. 15 & 29, 1908, (John Woodgate). 1♀, Raton, Aug. 27, (Cockerell).

OREGON: 7♀, 16♂, Antelope Mt., Harney County, 6500 ft., July 30 to Aug. 28, 1931, (D. K. Frewing). 4♂, Chemult, 4700 ft., Aug. 10, 1935, (Scullen and Ferguson). 1♂, 1♀, Klamath Lake, Aug. 30, 1932, (J. E. Davis). 2♂, five miles north of Fort Klamath, 4400 ft., Aug. 11, 1935, (Scullen).

UTAH: 1♂, Emery County, Aug. 16, 1921, (Grace O. Wiley). 7♂, 4♀, St. George, (A. M. Woodbury). 1♂, St. George, (Vasco M. Tanner).

WYOMING: 1♀, Crow Ht., Butte, Aug. (?), 27, 1896, (R. P. Currie).

Specimens of *nevadensis* have been identified also from the following localities: Colorado—Fort Garland, Aug. 14; Idaho—Soda Springs, Sept.; Montana—Bozeman.

Megachile (Xeromegachile) hookeri Cockerell

Megachile hookeri Cockerell, Ann. Mag. Nat. Hist., (8), xv, p. 533, 1915.

It seems somewhat doubtful that this is a distinct species, being very closely related to *nevadensis*, of which it may be a color variety. It answers to the description of *nevadensis* with only the following exceptions: Second to fourth terga rather deeply depressed basally; punctures quite coarse and sparse on vertex laterally; pubescence more whitish than ochraceous; scopa pale on sixth sternum.

Type.—Female; Lehi, Utah, September 9, 1905, (W. A. Hooker), (Hunter, no. 1015), [U.S.N.M., no. 21749].

Flower records.—Isocoma veneta var. *acradenia.*

Megachile (Xeromegachile) rubi Mitchell (Pls. XXII and XXVI.)

Megachile rubi Mitchell, Journ. Elisha Mitchell Soc., XL, p. 159, 1924.
Mitchell, Trans. Am. Ent. Soc., LII, p. 117, 1926.
Megachile neglecta Mitchell, Journ. Elisha Mitchell Soc., XL, p. 160, 1924.

Female.—Size: Length 11-12 mm.; breadth of abdomen 4 mm.; anterior wing 8 mm.

Structure: Face about as broad as long; eyes subparallel; clypeal margin very slightly incurved medially, otherwise entire, mandible 4-dentate; basal joint of flagellum subequal to pedicel, the second joint slightly shorter; lateral ocelli slightly nearer edge of vertex than to eyes; vertex nearly flat; cheeks subequal to eyes in width; hind metatarsi slightly narrower and distinctly shorter than their tibiae; abdomen ovoid, the sixth tergum distinctly triangular in dorsal aspect, convex in profile, the sides flattened, resulting in a rather definite median ridge from base to apex.

Puncturation: Fine and close on clypeus, face, vertex medially, pleura and sternum; somewhat more coarse and sparse on the shining mesonotum and scutellum, and on vertex laterally; minute and rather close on the abdominal terga, but very close on the basal and apical segments.

Color: Black; antennae more piceous beneath; tegulae obscurely reddened; wings lightly infuscated, somewhat darker apically, the nervures piceous to ferruginous; spurs yellowish-ferruginous.

Pubescence: White and rather long on face, cheeks, pleura, propodeum, legs and basal segment of abdomen; blackish on vertex, dorsum of thorax, short and black on the second to fifth abdominal terga; sixth tergum with white tomentum laterally, the median ridge with brownish tomentum, some short inconspicuous erect black hairs at sides basally; second to fifth terga with narrow entire white apical fasciae; mesonotum lacking any definite anterior lines of tomentum, and the scutello-mesothoracic suture not fasciate; scopa white, black on the sixth sternum and across the apical margin of the fifth.

Male.—Size: Length 10-11 mm.; breadth of abdomen 3 mm.; anterior wing 6 mm.

Structure: Face somewhat longer than broad; eyes very slightly convergent below; clypeal margin entire; mandible 3-dentate, the inferior projection acute and subbasal; second joint of flagellum slightly longer than the first, and the first slightly longer than the pedicel; lateral ocelli subequally distant from eyes and edge of vertex; vertex slightly convex, the hind margin very nearly straight; cheeks subequal in width to eyes; coxal spines, flattened, pointed, the coxae bare anteriorly and with a rather obscure patch of short ferruginous bristles anterior to the spines; front femur with the inferior margin slightly dilated and keeled; front tarsi flattened, slightly dilated, but considerably narrower than their tibiae, the anterior margin with a shallow concavity; carina of sixth tergum triangularly acute medially, finely and irregularly serrate laterally, apical margin of the tergum with conspicuous carinate median teeth which are considerably nearer the minute lateral teeth than to each other; seventh tergum produced into a conspicuous triangular median spine.

Sternites: Apical presternal sclerites of fifth sternum only partially delimited, very finely pubescent, the median portion of the presternite not at all linear, the medasternite about three times broader than long, quite widely separated from the presternite, uniformly covered with fine setae, but those fringing the basal margin much longer and apically dilated, the poststernal strip extensive, broadly incurved medially; lateral portions of sixth presternite much longer than broad, the medasternal areas extensive medially, only very slightly separated, the apical margin carinate, and rather uniformly but sparsely covered with slightly sinuate setae, the poststernal lobe very short and broad, the lateral angles acute.

Genital armature: Stipites narrowed above base, the apical half dilated, very slightly sinuate, sparsely beset with fine hairs; sagittae moderately robust, barely exceeding the tips of the stipites; volsellae obliquely truncate, the apex of the truncation narrowly rounded.

Puncturation: Very fine and close on cheeks and pleura; more coarse and slightly separated on vertex and dorsum of thorax; very fine and numerous, but distinctly separated on the shining abdominal terga.

Color: Black; antennae and tegulae more piceous; wings faintly infuscated, darker apically, the nervures piceous to ferruginous; front femur yellowish on anterior face, the upper face largely ferruginous, rimmed with black, the posterior face black; front tibia black on upper face, dark red on anterior face, the posterior face more yellowish, the apex entirely yellow on all faces; front tarsi pale ivory-yellow, margined posteriorly with black beneath.

Pubescence: White and rather long on head, thorax, legs and first two abdominal segments, but with some long black hairs intermixed on mesonotum, and a few shorter ones on vertex laterally; rather long and black on third to fifth abdominal terga, the second to the fifth with entire white apical fasciae, the sixth entirely white pubescent.

Type.—Female; Raleigh, N. C., May 8, 1922, (Mitchell; on *Rubus*), [U.S.N.M., no. 28353].

Range. — Known chiefly from Raleigh and from Harker's Island, near Beaufort, N. C., May and June. At Raleigh it is found only in sandy locations along streams. Definite records are as follows:

GEORGIA: 1♂, no locality record.

NORTH CAROLINA: 4♀, Harker's Island, June 11, 1931, (on *Cuscuta*). 16♂, 3♀, Raleigh, May 4 to 10, (on *Rubus*). 2♂, 3♀, Rollsville, Wake County, May 13, 1933 (on *Rubus*). 1♀, Rollsville, May 16, 1932, (on *Senecio*). 1♀, White Lake, May 20, 1934.

Flower records.—*Rubus* sp., *Cuscuta* (probably *arvensis*) and *Senecio.*

Megachile (Xeromegachile) subnigra Cresson

(Pls. XXII and XXVI.)

Megachile subnigra Cresson, Trans. Am. Ent. Soc., VII, p. 208, 1879. Friese, Das Tierr. Lfg. 28, Apidae I, p. 246, 1911. Cresson, Mem. Am. Ent. Soc., I, p. 131, 1916.

Female.—Size: Length 11-12 mm.; breadth of abdomen 4 mm.; anterior wing 8.5 mm.

Structure: Face slightly broader than long; eyes subparallel; clypeal margin straight, slightly thickened and shining; mandible 4-dentate; basal joint of flagellum somewhat longer than pedicel, the second joint shorter; lateral ocelli subequally distant from eyes and edge of vertex; vertex flat; cheeks slightly broader than eyes; hind metatarsi slightly narrower and considerably shorter than their tibiae; abdomen cordate, the terga but slightly if at all depressed basally or apically, the sixth tergum straight at sides in dorsal aspect, and straight in profile with visible erect pubescence.

Puncturation: Close and fine on head and thorax, but somewhat more coarse and distinct on lower portion of clypeus;. minute and close on abdomen basally, becoming quite sparse on the shining apical terga, but rather close on the sixth.

Color: Black; antennae more fuscous; tegulae reddish-fuscous; wings subhyaline, slightly darker apically, the nervures blackish or fuscous; mid and hind spurs black.

Pubescence: White on mesonotum, scutellum, upper parts of pleura, and on the first two abdominal terga, the inner orbits with patches of white pubescence, and dense white tufts on pronotal tubercles and behind wings; otherwise black, with entirely black scopa, and with no pale abdominal fasciae, a few black hairs at extreme sides of the second tergum which is otherwise white pubescent.

Male.—Size: Length 10-11 mm.; breadth of abdomen 3.5 mm.; anterior wing 7 mm.

Structure: Face about as broad as long; eyes subparallel; clypeal margin entire; mandible 3-dentate, inferior projection acute, subbasal; basal joint of flagellum almost twice the length of the pedicel, the second joint only slightly longer than the pedicel, the apical one flattened and broadly dilated; lateral ocelli slightly nearer eyes than to edge of vertex; vertex flat; cheeks slightly broader than eyes; coxal spines flattened, triangularly acute, short, broad at base, with a patch of reddish bristles on outer half of base; front femur with inferior margin distinctly keeled apically; front tarsi dilated, but distinctly narrower than their tibiae, the anterior margin deeply excavated; abdominal terga but slightly depressed basally, but rather deeply so apically; carina of sixth tergum slightly irregularly crenulate, produced medially into a triangularly pointed projection, the apical margin of the tergum with carinate median teeth which are slightly nearer the lateral teeth than to each other; seventh tergum conspicuous, produced medially into an acute spine.

Sternites: Apical sclerites of fifth presternite ovoid, quite densely pubescent, the lateral portions of the presternite longer than broad, the median portion slightly bowed and almost linear, the medasternite broader basally than apically, widely separated from the presternite on all sides, quite uniformly covered with fine simple setae, the basal margin straight, poststernal strip nearly straight medially, with a median tuft of fine setae; lateral portions of sixth presternite long and narrow, the medasternal areas elongate ovoid, quite uniformly covered with fine, more or less flexed setae, poststernal lobe very small, about as broad as long, without conspicuous angles.

Genital armature: Stipites narrowed above base, rather gradually dilated to the broad obliquely truncated tips, the inner faces of which are beset with numerous short setae, a tuft of longer setae fringing the outer margin apically; sagittae rather straight and slender, slightly exceeding the stipites; volsellae quite robust, subtruncate.

Puncturation: Fine, shallow, but rather close on cheeks, becoming deeper and more distinctly separated on vertex; fine and close on thorax throughout, but more distinctly separated near center of mesonotum; minute and close on abdomen basally, but becoming quite sparse on the shining more apical terga, but the sixth finely and closely punctate.

Color: Black; antennae and tegulae more piceous; wings subhyaline, slightly clouded apically, the nervures brownish; front femur largely dark, but with the polished anterior face mostly dark ferruginous; front tibia dark on outer face except for the yellowish apex, largely yellowish-ferruginous on the other two faces; front tarsi yellowish, the joints with dark spots beneath; mid and hind spurs blackish.

Pubescence: Entirely white on head; white on thorax except for some dark hairs on pleura posteriorly, and white on the first two abdominal segments, on all the coxae, and on front femora; entirely black on third to sixth abdominal segments and on mid and hind legs below coxae, the mid tarsal fringes fuscous, long and conspicuous; front tarsal fringe white above, blackish toward base and beneath.

Type.—Female; Nevada, [A.N.S.P., no. 2423].

Range.—Colorado to California, north to British Columbia. Definite records include the following.

IDAHO: 2♀, Pocatello, June 24, 1908, (Titus). 1♂, Snake River, Divide Creek, May 10, 1925, (A. L. Melander).

OREGON: 1♀, Antelope Mt., Harney County, 6500 ft., July 4, 1931, (D. K. Frewing). 2♀, Steen Mts., Harney County, June 25, 1922, (E. C. Van Dyke) 1♂, 2♀, Warner Mts., Lake County, June 19, 1922, (Van Dyke). 1♀, Warner Mts., Lake County, June 14, 1923 (W. J. Chamberlain).

WYOMING: 1♂, Rawlins, June 26, 1920. Also identified from Jackson and Worland.

Specimens of *subnigra* have also been identified from the following localities: Penticton, British Columbia; Pagosa Springs, Colorado; Huntley, Montana; and Ritzville and Yakima City, Washington.

Megachile (Xeromegachile) pseudonigra Mitchell

Megachile pseudonigra Mitchell, Psyche, XXXIV, p. 112, 1927.

It is possible that this species is nothing more than a color variation of *subnigra,* although the puncturation of the more apical abdominal terga in *pseudonigra* is somewhat more coarse and close than in *subnigra.* This point cannot be satisfactorily settled until the male of *pseudonigra* has been recognized and compared with that of *subnigra.*

Female.—Size: Length 11 mm.; breadth of abdomen 4 mm.; anterior wing 8 mm.

Structure: Face slightly broader than long; eyes subparallel; clypeal margin straight, more or less " rolled " or thickened, and polished; mandible 4-dentate; basal joint of flagellum longer than pedicel, the second joint slightly shorter than the pedicel; lateral ocelli subequally distant from eyes and edge of vertex; vertex flat; cheeks subequal in width to eyes; hind metatarsi slightly narrower and considerably shorter than their tibiae;

abdomen cordate, the terga only slightly depressed basally or apically, the sixth very nearly straight at sides in dorsal aspect, and straight in profile, with abundant erect hair visible.

Puncturation: Close and fine on head and thorax in general, but more coarse and sparse in center of mesonotum; minute and close on abdomen basally, becoming relatively more sparse to the fifth tergum, but close and fine on the sixth.

Color: Black; antennae and tegulae more fuscous; wings subhyaline, slightly clouded apically, the nervures piceous to brown; spurs dark brownish.

Pubescence: Entirely black on head, thorax and legs, and black on abdomen, with entirely black scopa, but the second to fifth terga with definite entire and fairly conspicuous brownish or fuscous apical fasciae, quite distinct from the otherwise black pubescence.

Type.—Female; Umatilla, Oregon, June 24, 1882, (Samuel Henshaw), [M. C. Z., no. 15718].

Range.—Arizona, California and Oregon, April to July. Definite records are as follows:

ARIZONA: 1♀, Oslar, Catalina Mts., June 26, 1917.

CALIFORNIA: 1♀, Southern California. 1♀, Hopland, May 9, 1926, (Van Duzee). 1♀, Panoche Ck., April 30, 1922, (A. J. Basinger).

OREGON: 1♀, 12-15 miles east of Ashland, Dead Indian Road, 4500-4900 ft., July 17, 1930, (H. A. Scullen).

Megachile (Xeromegachile) fucata Mitchell (Pl. XXVI.)

Megachile (*Xeromegachile*) *fucata* Mitchell, Trans. Am. Ent. Soc., LIX, p. 323, 1934.

Only the sternites and genital armature remain to be described.

Sternites: Lateral portions of fifth presternite broader than long, median portion not linear, apical sclerites moderately large, ovoid, densely clothed apically with long fine pubescence, the medasternite twice as broad as long, closely set with short setae, the more basal ones dilated and flexed apically, the poststernal strip nearly straight, with a median tuft of fine setae; lateral portions of sixth presternite somewhat longer than broad, the medasternal areas distinctly separated medially, terminated laterally by a short angulated carina, densely clothed with long setae which are somewhat flattened and flexed apically, the poststernal lobe very broad, quite extensive, the lateral angles obtuse or rounded.

Genital armature: Stipites narrowed above base, considerably dilated toward the obliquely compressed tips, dorsal inner surface and outer margin of tips clothed with long plumose hairs; sagittae moderately robust, nearly straight, tips slightly flexed and slightly exceeding the stipites; volsellae robust, triangular or obliquely truncate apically.

Type.—Male; Alamogordo, New Mexico, April 29, 1902, [A.N.S.P., no. 4159].

Range.—New Mexico, Utah and California. Three additional specimens are to be recorded as follows. 1 ♂, Coachella Valley, Calif., April 9, 1936, (Michener). 1 ♂, two miles south of Oasis, Calif., March 8, 1936, (Timberlake on *Larrea divaricata*). 1 ♂, LaVerkin, Utah, (Vasco M. Tanner).

Flower record.—Larrea divaricata.

Megachile (Xeromegachile) histrata Mitchell

Megachile (*Xeromegachile*) *histrata* Mitchell, Trans. Am. Ent. Soc., LIX, p. 334, 1934.

The data on the type specimen of *histrata* female is the same as that on the type male of *fucata*, which suggests the possibility that the two are the same. Furthermore, Professor Timberlake has collected the two at the same place and on the same flower, furnishing good if not conclusive evidence for the relationship.

Type.—Female: Alamogordo, New Mexico, April 29, 1902, [A.N.S.P., no. 4162].

Range.—New Mexico and California. One additional specimen is to be recorded as follows: 1 ♀, two miles south of Oasis, California, March 8, 1936, (Timberlake; on *Larrea divaricata*).

Flower record.—Larrea divaricata.

Megachile (Xeromegachile) bruneri Mitchell (Pl. XXIII.)

Megachile (*Xeromegachile*) *bruneri* Mitchell, Trans. Am. Ent. Soc., LIX, p. 328, 1934.

A similarity in range and in the general appearance indicates the possibility that *hilata* is the female of this species. The sternites and genital armature are still to be described.

Sternites: Lateral portions of the fifth presternite about as broad as long, median portion short linear, apical sclerites rather large, with dense and rather long pubescence apically, the medasternite about three times broader than long, widely separated from median portion of presternite, quite closely set with moderately long and robust setae, the more apical ones simple, those toward the base broadly dilated and flattened apically, the poststernal strip almost straight, with a broad median tuft of setae; lateral portions of sixth presternite longer than broad, the medasternal areas rather extensive, widely separated, terminated laterally by a short carina, covered with sinuate setae, the more apical ones very long, the poststernal lobe much broader than long, lateral angles produced into long ear-like subacute lobes.

Genital armature: Stipites considerably narrowed above base, dilated, obliquely compressed and slightly sinuate toward apex, the dorsal inner surface with rather fine hairs which extend to the outer margin of the apex; sagittae robust, almost straight, tips slightly narrowed, exceeding the tips of stipites; volsellae rather small, elongate triangular, with narrowly rounded apex.

Type.—Male; Fort Garland, Colorado, August 14, (L. Bruner; on *Chrysothamnus*), [Univ. Nebr.].

Range.—Colorado. No specimens other than the type series of seven males have been seen.

Flower records.—*Chrysothamnus* sp.

Megachile (Xeromegachile) hilata Mitchell

Megachile (*Xeromegachile*) *hilata* Mitchell, Trans. Am. Ent. Soc., LIX, p. 332, 1934.

It is possible that this species is the female of *bruneri*, to which it bears some resemblance so far as color pattern of pubescence and size is concerned, and has a similar range. It was described in Part 1 of this revision.

Type.—Female; Meeker, Colorado, about 6200 feet, July 20 or 21, 1919, [Am. Mus. Nat. Hist.].

Range.—Colorado. No specimens other than the type series of five females have been seen.

Megachile (Xeromegachile) maurata new species

(Pls. XXII and XXVI.)

Male.—Size: Length 9.5 mm.; breadth of abdomen 3 mm.; anterior wing 6.5 mm.

Structure: Face very slightly broader above than long; eyes slightly convergent below; clypeal margin straight and entire medially; mandibles 3-dentate, the inferior projection basal, acute; basal joint of flagellum subequal to second joint, slightly longer than pedicel, the apical joint broadly dilated and flattened; lateral ocelli very slightly nearer to eyes than to edge of vertex; vertex somewhat rounded; cheeks broader than eyes; front coxae bare and shining, with broadly triangular flattened spines with a small patch of reddish bristles at the base of each; front femora dilated apically, with a definite ventral keel; front metatarsi broadly dilated and flattened, deeply excavated anteriorly, the tips only slightly produced; *hind metatarsi about twice as long as broad; abdominal terga quite deeply* depressed across base and apex, carina of sixth tergum triangular, angulate medially the margin on each side slightly and rather irregularly serrate, median teeth of the apical margin robust, carinate, slightly nearer the triangular lateral angles than to each other; seventh tergum rather robust, subtriangular, the apex produced into a short slender spine.

Sternites: Fifth presternite almost linear medially, lateral portions longer than broad, the apical sclerites large, rounded, quite uniformly pubescent, the medasternite deeply incised on each side, rounded basally, widely separated from presternite, covered with setae, the more basal of which are apically dilated, poststernal strip incurved medially, produced and conspicuous on each side of center; lateral portions of sixth presternite longer than broad, the medasternal areas rather extensive toward center, distinctly separated medially, covered with long setae which are slightly flexed apically, the poststernal lobe narrow, longer than broad, lateral angles obscure.

Genital armature: Stipites broadly and obliquely dilated toward apex, but narrowed at tips, the dorsal inner face of each densely covered with quite long simple bristles; sagittae relatively slender, straight, slightly longer than stipites; volsellae obliquely rounded or subtruncate.

Puncturation: Close and fine on face, on mesonotum and scutellum laterally, and on vertex medially; minute and densely crowded on clypeus beneath beard and on cheeks below; relatively coarse and distinctly separated on vertex laterally, on mesonotum medially, finer but distinctly separated on pleura and on scutellum medially, the latter with a median impunctate line; minute and close but obscure on the basal abdominal segments, becoming sparse but distinct on the polished discs of the fourth and fifth terga, fine close and indistinct on the sixth.

Color: Black; antennae brownish-ferruginous; tegulae and wing nervures more yellowish-ferruginous, the wings subhyaline, slightly clouded apically; femur ferruginous on upper face, blackish on posterior face except for the yellowish-ferruginous apical keel, the remaining face blackish above, ferruginous below; front tibia reddish-piceous on outer face, the tip yellow, the other two faces ferruginous; front tarsi yellow, the second and third joints with small rounded black spots beneath; mid and hind legs mostly blackish, spurs yellowish-ferruginous.

Pubescence: Entirely white on head, thorax, legs and basal segments of abdomen (dorsum of thorax and abdomen considerably rubbed), the fifth and sixth terga with scattered blackish hairs; second to fifth terga apparently with entire white apical fasciae (specimen in poor condition); front tarsal fringes rather short, white above, more golden beneath; mid tarsal fringes rather long and thin, entirely white.

Type.—Male; Green River, Wyoming, 6100 feet, July 2, 1920, [Am. Mus. Nat. Hist.].

Megachile (Xeromegachile) alata Mitchell (Pl. XXV.)

Megachile (*Xeromegachile*) *alata* Mitchell, Trans. Am. Ent. Soc., LIX, p. 324, 1934.

Only the sternites and genital armature remain to be described.

Sternites: Apical margin of fifth sternum nearly straight, basal margin very deeply incurved, median portion not at all linear, basal area of lateral portions slender, apical sclerites rather small, minutely pubescent, the medasternite three times broader than long, uniformly set with fine setae, the more basal areas dilated apically, the poststernal strip nearly straight medially, more conspicuous laterally, with a broad median tuft of setae; lateral portions of sixth presternite longer than broad, medasternal areas rather extensive, broad and widely separated medially, narrowed to a short sharp carina laterally, quite uniformly set with setae, the more apical ones quite robust and sinuate, the poststernal lobe quite extensive, much broader than long, lateral angles acute.

Genital armature: Stipites narrowed above base, gradually dilated to the obliquely truncate and compressed apex, dorsal inner surface toward apex sparsely short setose, outer margin of tip with some long fringing hairs; sagittae moderately robust, nearly straight, but the tips slightly flexed and slightly exceeding the stipites; volsellae robust, broadly rounded or subtruncate apically.

Type.—Male; Palm Canyon, California, April 3, 1925, (P. H. Timberlake), [U.S.N.M., no. 44246].

Range.—California. Since the publication of data on the type series an additional specimen has been received bearing the following data: 1 ♂, Palm Springs, Andreas Canyon, California, April 23, 1933. (Timberlake; on *Bebbia juncea*).

Flower records.—*Bebbia juncea.*

Megachile (Xeromegachile) redlandica Mitchell

Megachile (*Xeromegachile*) *redlandica* Mitchell, Trans. Am. Ent. Soc., LIX, p. 331, 1934.

A specimen of *redlandica* was received from Prof. Timberlake with a note suggesting that it might be the female of *alata*. Although the relationship remains to be proven, it seems quite probable.

It was fully described in Part 1 of this revision.

Type.—Female; Redlands, California, April 14, (F. R. Cole), [U.S.N.M., no. 39980].

Range.—California. Two additional specimens are to be recorded as follows: 1 ♀, Palm Springs, Andreas Canyon, March 24, 1933, (Timberlake; on *Encelia farinosa*). 1 ♀, Palm Springs, Andreas Canyon, April 10, 1936, (C. D. Michener; on *Encelia farinosa*).

Flower record.—Encelia farinosa.

Megachile (Xeromegachile) angelica Mitchell (Pl. XXVI.)

Megachile (*Xeromegachile*) *angelica* Mitchell, Trans. Am. Ent. Soc., LIX, p. 318, 1934.

Only the sternites and genital armature remain to be described.

Sternites: Lateral portions of fifth presternite somewhat longer than broad, apical sclerites quite large, rounded apically, covered with long dark hairs, median portion of presternite almost linear, the medasternite widely separated from presternite both laterally and basally, about twice as long as broad, rather uniformly covered with setae of moderate length, the more basal setae long and obscurely dilated apically, the apical setae simple, the poststernal strip conspicuous, straight except for a small median emargination in which is located a tuft of setae; lateral portions of sixth presternite longer than broad, medasternal areas elongate ovoid, distinctly separated, covered with flattened and apically flexed setae, the poststernal lobe small, narrowed apically, lateral angles not produced.

Genital armature: Stipites narrowed above base, gradually dilated apically, the apical third obliquely compressed and with a broad ventral oblique truncation, tip rounded on outer side, dorsal inner surface closely set with very short setae, some longer hairs on outer margin near tip; sagittae robust basally, more slender apically, slightly exceeding the stipites; volsellae robust, rounded apically.

Type.—Male; Los Angeles County, California, (Coquillett, no. 148), [U.S.N.M., no. 39971].

Range.—California to Colorado. Since the publication of the list of paratypes of this species two additional specimens bearing the following data have been received: 2 ♂, Palm Springs, Andreas Canyon, California, April 23, 1933, (Timberlake; on *Bebbia juncea*).

Flower records.—Bebbia juncea.

Megachile (Xeromegachile) instita Mitchell (Pl. XXV.)

Megachile (*Xeromegachile*) *instita* Mitchell, Trans. Am. Ent. Soc., LIX, p. 326, 1934.

Only the sternites and genital armature remain to be described.

Sternites: Lateral portions of fifth presternite broader than long, median portion not quite linear, apical sclerites small, minutely pubescent, the medasternite three times broader than long, uniformly set with short setae, those toward the base dilated apically, the poststernal strip straight, with a broad tuft of short setae medially; lateral portions of sixth presternite longer than broad, apical margin of each triangularly pointed, the medasternal areas rather broad and well separated medially, terminated laterally by a curved carina, uniformly covered with rather short robust and sinuate setae, the poststernal lobe broad and short, lateral angles acute.

Genital armature: Stipites narrowed above base, gradually dilated to the obliquely compressed tips, dorsal inner surface toward apex with a few very short hairs, outer margin at tips fringed with long hairs; sagittae robust, slightly bowed, tips somewhat enlarged, considerably exceeding the stipites; volsellae robust, obliquely truncate apically.

Type.—Male; Alamogordo, New Mexico, April 26, 1902, [A.N. S.P., no. 4160].

Range.—New Mexico. No additional material has been found other than the type series of three topotypical males.

Megachile (Xeromegachile) micheneri new species (Pls. XXII and XXV.)

Male.—Size: Length 11 mm.; breadth of abdomen 4 mm.; anterior wing 8.5 mm.

Structure: Face about as broad above as long; eyes very slightly convergent below; apical margin of clypeus straight and entire; mandibles 3-dentate, the inferior projection sub-basal, triangular and acute; basal joint of flagellum slightly longer than pedicel, subequal to the second joint, apical one not appreciably dilated; lateral ocelli distinctly nearer eyes than to edge of vertex; vertex very slightly convex, its hind border slightly incurved; cheeks slightly broader than eyes; front coxae bare anteriorly, each with a rounded patch of reddish bristles just anterior to the spine, the spines rather short, somewhat flattened, with long white posterior fringes; front femora keeled beneath and moderately dilated apically; front metatarsi excavated anteriorly, dilated, but slightly narrower than their tibiae, front and hind margins nearly parallel, apex only slightly produced, second joint only slightly dilated, the others not at all (similar to *rubi*, Plate XXII); hind metatarsi nearly three times longer than broad; discs of abdominal terga deeply depressed both basally and apically, especially on the more apical segments; carina of sixth tergum rounded, its margin irregularly serrate, surface above the carina with a distinct median ridge toward the base, apical margin of the segment with carinate median teeth which are much nearer the small acute lateral angles than to each other; seventh tergum robust, with a conspicuous triangular acute median projection.

Sternites: Lateral portions of fifth presternite subtriangular, median portion much restricted but not linear, the apical sclerites quite large, nearly ovoid, finely pubescent, medasternite three times broader than long, angulate at each extreme side, uniformly covered with short and rather robust setae, those toward the basal margin with flexed and broadly dilated tips, poststernal strip outcurved on each side of middle, apical margin medially with a fringe of simple setae, those toward the center robust; lateral portions of sixth presternite longer than broad, the medasternal areas extensive, especially toward center, rather widely separated, uniformly covered with simple setae which are more or less flexed apically, the more apical ones very long, poststernal lobe much broader than long medially, but the lateral angles produced into long slender slightly curved lobes.

Genital armature: Stipites sinuate, slightly dilated toward apex, dorsal inner surface toward tips thickly beset with short simple setae, tips with a prominent lateral tuft of hairs; sagittae robust, straight, considerably exceeding the stipites in length; volsellae small, triangularly pointed.

Puncturation: Very fine and close on clypeus beneath beard; minute and densely crowded on cheeks below, more coarse deep and distinct, but yet close on vertex and upper portion of cheeks; close and rather coarse over pleura and dorsum of thorax, only very slightly separated in center of mesonotum, more widely so on the more shining scutellum medially; minute and dense on the more basal abdominal terga, becoming quite coarse but still quite close on the fifth, the sixth more finely rugoso-punctate.

Color: Black; antennae more piceous; tegulae and wing nervures reddish-piceous, the wings lightly infuscated, slightly darker apically, front femur mostly ferruginous on anterior face, blackish on its upper margin and on the other two faces; front tibia black on outer face, dark ferruginous on the other two, tip yellow; front tarsi yellow, a black spot on the second joint and on the apex of the metatarsus beneath; mid and hind legs black; spurs yellowish.

Pubescence: Entirely white except for a few short inconspicuous darker hairs on vertex laterally; posterior fringe of front tarsi white above, reddish beneath; mid tarsi with long posterior white hair fringes; second to fifth abdominal terga with conspicuous entire white apical fasciae.

Type.—Male; Northeast Larrimer County, Colorado, August 27, 1935, (C. D. Michener). [Michener].

Megachile (Xeromegachile) mucorosa Cockerell
(Pls. XXII and XXIII.)

Megachile mucorosa Cockerell, Ann. Mag. Nat. Hist., (8), I, p. 265, 1908.

Male.—Size: Length 11-12 mm.; breadth of abdomen 4 mm.; anterior wing 8 mm.

Structure: Face about as broad as long; eyes slightly convergent below; clypeal margin with a rather broad slightly produced median area, otherwise entire; mandible 3-dentate, inferior projection rather slender, acute, subbasal; basal joint of flagellum very slightly longer than pedicel, the second joint longer than the first, the apical one hardly dilated; lateral ocelli slightly nearer eyes than to edge of vertex; vertex slightly rounded; cheeks slightly broader than eyes; coxal spines moderately long, narrowed apically, the tips rounded, the coxae with two or three obscure reddish bristles anteriorly; front femora but slightly dilated apically, the lower apical margin keeled; front tarsi neither dilated not flattened, the fringe short; mid tarsal fringe also short; abdomen short and somewhat parallel-sided, the fourth and fifth terga very deeply depressed apically, the apical margins of the second and third deeply depressed toward sides and somewhat depressed basally; carina of sixth tergum irregularly triangular, and finely and irregularly serrate, with a median longitudinal ridge toward the base of the tergum, the carinate median teeth of the apical margin of the tergum nearer the small acute lateral teeth than to each other; seventh tergum produced medially into a triangularly pointed spine.

Sternites; Apical presternal sclerites of fifth sternum obscurely defined, rather small, moderately pubescent, the remainder of the presternite extensive, both medially and laterally, with an obscure indiscernible apical margin, the medasternite short but quite broad, sparsely covered with short setae which are broadly dilated apically, the poststernal strip broadly incurved medially, with only extremely minute hairs medially; lateral portions of sixth presternite somewhat longer than broad, the medasternal areas rather restricted, especially laterally, quite widely separated medially, beset with quite robust curved setae, the poststernal lobe broad and rather short, its apical margin slightly incised medially, slightly outcurved on each side of this, lateral angles acute but not produced.

Genital armature: Stipites narrowed above base, slightly dilated and sinuate apically, the apical third sparsely beset with hairs dorsally, tips triangularly acute, with a small tuft of fine hairs laterally, and with a ventral subapical carinate ridge which is fringed with minute hairs; sagittae robust, slightly exceeding the stipites; volsellae broadly triangular apically.

Puncturation: Very fine and close on cheeks, pleura, scutellum, legs, and abdomen throughout; extremely fine and quite sparse on vertex laterally, closer medially, the surface finely tessellate; minute, sparse and inconspicuous on the finely tessellated and consequently dull mesonotum.

Color: Black; antennae more piceous; tegulae dark bronzy, yellowish anteriorly; wings subhyaline, slightly clouded apically, the nervures brownish to yellowish; tips of front and mid tibiae yellowish, outer face of the front tibia blackish, the other two faces yellowish-ferruginous; anterior and upper faces of front femur with polished ferruginous areas; front tarsi largely dark; spurs yellow.

Pubescence: Rather long, creamy-white throughout, without any dark admixture; second to fifth abdominal terga with entire white apical fasciae; dorsum of thorax without evident lines or fasciae of white tomentum.

Type.—Male; Boulder, Colorado, August 9, 1906, (W. P. Cockerell), [U.S.N.M., no. 29382].

Range.—Colorado and Nebraska, July. Definite records are as follows:

Colorado: 3♂, Boulder County, July 4 and 27, Aug. 1, 1925, (C. P. Custer). 1♂, Estes Park, 7500 feet, July 23, 1916. Identified also from Bear Creek, Bellevue and Clear Creek.

Nebraska: 1♂, Bridgeport, July 11, 1917, (C. E. Mickel). Identified also from Haigler, (July 9, 1911).

Flower records.—*Eustoma inssenianum* and bluebell.

Megachile (Xeromegachile) soledadensis Cockerell

(Pls. XXII and XXVI.)

Megachile soledadensis Cockerell, Ann. Mag. Nat. Hist., (7), vi, p. 12, 1900.

A female ascribed to this species was briefly described along with the type male, but this has not been examined and is not included here therefore. A cotype is located in the U. S. National Museum, and is lacking both the head and abdomen. The front coxal spines are distinctive, however, and the single specimen at hand has been compared with the cotype and agrees in all the characters of the thorax and legs.

Male.—Size: Length 10 mm.; breadth of abdomen 3.5 mm.; anterior wing 7.5 mm.

Structure: Face slightly broader above than long; eyes slightly convergent below; clypeal margin slightly incurved medially, with a mere trace of a median denticle; mandible 3-dentate, inferior projection subbasal, relatively narrow and acute; basal joint of flagellum subequal to pedicel, the second joint fully twice as long, the apical one broadly dilated and flattened; lateral ocelli slightly nearer eyes than to edge of vertex; vertex nearly flat; cheeks subequal in width to eyes; coxal spines very short, strongly divergent, each coxa with a dense patch of reddish bristles just anterior to the base of each spine; front femur slightly dilated apically, the inferior margin keeled; front tarsi dilated, not quite equalling their tibiae in width, the metatarsus with a bare suggestion of a concavity on the pubescent anterior margin; abdominal terga slightly depressed basally, deeply and abruptly depressed along the apical margins; carina of sixth tergum triangular in outline, irregularly crenulate, the disc protuberant toward the base medially, apical margin of the tergum with carinate median teeth which are nearer the lateral teeth than to each other; seventh tergum triangularly pointed medially.

Sternites: Apical presternal sclerites of fifth sternum extensive, triangular, clothed over apical half with fine pubescence, median portion of presternite short, the medasternite subtriangular, but the posterior margin obscure, clothed with rather fine apically dilated setae, these crowded apically, more sparse but longer posteriorly, the poststernal strip conspicuous laterally, broadly incurved medially; lateral portions of sixth presternite longer than broad, rounded apically, the medasternal areas extensive, slightly arched, distinctly but not widely separated medially, closely covered with short, slightly sinuate setae; the poststernal lobe broad and rather short, lateral angles acute, but slightly produced.

Genital armature: Stipites narrowed above base, sinuate but only slightly dilated toward tip, with short latero-apical fringes of long hairs which lie parallel to the ventral subapical grooves which are fringed with short minute setae; sagittae robust, slightly exceeding the stipites; volsellae triangularly acute apically.

Puncturation: Fine and close over entire head and thorax; minute and fine on abdomen basally, becoming quite coarse but still close on the fifth tergum, the sixth rather finely rugoso-punctate.

Color: Black; antennae obscurely reddish beneath; tegulae yellowish; wings hyaline, slightly clouded apically, the nervures ferruginous; front femur largely dark on upper and posterior faces, polished yellowish-ferruginous on anterior face; front tibia dark on outer face, yellowish-ferruginous apically and on the other two faces; front tarsi yellow, second joint with a posterior dark spot beneath; mid and hind legs dark, the spurs yellow.

Pubescence: Entirely greyish-white, with no dark admixture; tarsal fringes white, the front ones golden-brown beneath; second to fifth abdominal terga with entire white apical fasciae; mesonotum with barely evident anterior oblique lines of white tomentum, and the scutello-mesothoracic suture with a barely evident white fascia.

Type.—Male; Soledad Canyon, Organ Mts., New Mexico, August 15, (C. H. T. Townsend).

The type series included two topotypical males, one topotypical female (not examined), and one male, Mesilla Valley, (Townsend, on *Baileya multiradiata*).

Range.—California to Texas. Definite records are as follows:

ARIZONA: 1 ♂, Sonorita, August 9, 1924, (E. P. Van Duzee).

CALIFORNIA: 1 ♂, Whitewater Canyon, September 11, 1935, (Timberlake; on *Bebbia juncea*).

TEXAS: 1 ♂, Austin, May.

Flower records.—Baileya multiradiata.

Megachile (Xeromegachile) wyomingensis Mitchell (Pl. XXV.)

Megachile (*Xeromegachile*) *wyomingensis* Mitchell, Trans. Am. Ent. Soc., LIX, p. 327, 1934.

Only the sternites and genital armature remain to be described.

Sternites: Lateral portions of fifth presternite somewhat longer than broad, the apical sclerites quite large, with short and fine pubescence, median portion of the presternite not quite linear, the medasternite ovoid in outline, about twice as long as broad, covered with rather short fine setae, the more basal of which are obscurely dilated apically, the poststernal strip nearly straight medially; lateral portions of sixth presternite somewhat arcuate, longer than broad, the medasternal areas extensive, only slightly separated medially, covered with sinuate setae, those toward the basal margin very fine, the more apical ones long and rather robust, the poststernal lobe rather extensive, the lateral angles elongate, subacute.

Genital armature: Stipites narrowed above base, dilated and obliquely compressed apically, the tips obliquely truncate, dorsal inner surface apically covered with long fine simple setae, these extending to the outer margin at apex; sagittae somewhat exceeding the stipites, rather robust and very slightly bowed; volsellae robust, the tips rounded on outer side, concave on inner side.

Type.—Male; Worland, Wyoming, July 5, 1917, (L. Bruner), [Univ. Nebr.].

This is a unique specimen.

Megachile (Xeromegachile) blaisdelli Mitchell

Megachile (*Xeromegachile*) *blaisdelli* Mitchell, Trans. Am. Ent. Soc., LIX, p. 336, 1934.

One specimen examined since the publication of the description of this species differs from the typical form in having the central portion of the scopa white. It is black, however, along the sides and at the tip.

Type.—Female; Coronado, California, June 2, 1890, (F. E. Blaisdell), [California Ac. Sc., no. 3617].

Range. — California and Oregon. Following is the one additional record; 1 ♀, mouth of San Antonio Canyon, Los Angeles County, Calif., April 2, 1933, (C. D. Michener; on *Baccharis viminea*).

Flower records.—*Encelia californica, E. farinosa, Chaenactis glabrinscula, Baccharis viminea,* and cultivated *Coreopsis.*

Megachile (Xeromegachile) bradleyi Mitchell

Megachile (Xeromegachile) bradleyi Mitchell, Trans. Am. Ent. Soc., LIX, p. 340, 1934.

This species was fully described in Part 1 of this revision.

Type.—Female; Las Vegas, Nevada, September 17, 1908, (J. C. Bradley), [Cornell Univ., no. 1110].

In the original designation of this type specimen, the type number was erroneously omitted.

Range.—Nevada. No material other than the type series of two specimens has yet come to hand.

Megachile (Xeromegachile) coloradensis new species

Female.—Size: Length 11 mm.; breadth of abdomen 4 mm.; anterior wing 8 mm.

Structure: Face slightly broader above than long; eyes very slightly convergent below; clypeal margin straight, the edge slightly grooved; mandible 4-dentate; second joint of labial palpus slightly longer than first (ratio about 13:11); basal joint of flagellum slightly longer than either the pedicel or the second joint; lateral ocelli subequally distant from eyes and edge of vertex; vertex nearly flat; cheeks slightly broader than eyes; all the metatarsi shortly and narrower than their tibiae; segments two to four of abdomen slightly grooved across base, the fifth not grooved, apical margins of the segments depressed slightly toward sides; sides of sixth tergum in dorsal aspect slightly concave, broadly rounded or subtruncate apically, straight in profile, with abundant short erect hairs visible.

Puncturation: Close and fine on face, vertex, mesonotum, scutellum and pleura above, somewhat more coarse and distinct on clypeus medially and on pleura below, shallow and close on cheeks; very minute and close on abdomen basally, becoming more distinct but still very fine and close to the fifth and sixth terga.

Color: Black; antennae piceous; tegulae reddish-piceous; wings hyaline, faintly clouded apically, the nervures reddish-piceous; spurs yellow.

Pubescence: White or creamy yellow on face, cheeks, pleura, scutellum, propodeum, legs and first and second segments of abdomen; blackish on vertex laterally, in center of disc of mesonotum and discs of third to fifth abdominal terga, the sixth with short erect black hairs basally, covered with pale appressed tomentum apically; abdominal segments with entire ochraceous apical fasciae, the more basal ones narrow, the apical ones dense and conspicuous; scopa white, reddish on the apical portion of the sixth sternum.

Type.—Female; Boulder County, Colorado, August 12, 1925, (C. H. Hicks).

Megachile (Xeromegachile) impartita Mitchell

Megachile (*Xeromegachile*) *impartita* Mitchell, Trans. Am. Ent. Soc., LIX, p. 333, 1934.

Type.—Female; Colorado, [A.N.S.P., no. 4161].

This is a unique specimen.

Megachile (Xeromegachile) latita Mitchell

Megachile (*Xeromegachile*) *latita* Mitchell, Trans. Am. Ent. Soc., LIX, p. 335, 1934.

Type.—Female; Worland, Wyoming, July, 1911, (L. Bruner), [Univ. Nebr.].

Range.—Colorado and Wyoming. The single paratype is from Maybell, Colorado, Aug. 1, 1904, [Colo. Dept. Ent.].

Megachile (Xeromegachile) moschata Mitchell

Megachile (*Xeromegachile*) *moschata* Mitchell, Trans. Am. Ent. Soc., LIX, p. 338, 1934.

Type.—Female; Riverside, California, May 3, 1928, (Timberlake; on garden *Coreopsis*), [U.S.N.M., no. 44249].

Range.—California. One additional female sent in by Prof. Timberlake bears the following data: Riverside, April 14, 1933, (Timberlake; on *Chaenactis glabriuscula*).

Flower records.—*Chaenactis glabriuscula*, garden *Coreopsis*.

Megachile (Xeromegachile) mojavensis Mitchell

Megachile (*Xeromegachile*) *mojavensis* Mitchell, Trans. Am. Ent. Soc., LIX, p. 340, 1934.

Type.—Female; Mojave, Kern County, California, June 1, 1917, (C. L. Fox), [Calif. Ac. Sc., no. 3618].

Range.—California. No specimens other than the type series of two females have been seen.

Megachile (Xeromegachile) nelsoni new species

Female.—Size: Length 12 mm.; breadth of abdomen 4.5 mm.; anterior wing 9 mm.

Structure: Face broader above than long; eyes slightly convergent below; clypeal margin straight and entire; mandible 4-dentate; basal joint of flagellum longer than either the pedicel or the second joint, these two subequal; lateral ocelli subequally distant from eyes and edge of vertex; vertex nearly flat; cheeks slightly broader than eyes; metatarsi shorter and more narrow than their tibiae; second to fifth segments of abdomen slightly grooved across base, the apical margins depressed, especially toward sides, sixth tergum in dorsal view triangular with truncate apex, with an obscure median ridge, straight in profile with abundant short erect hairs visible.

Puncturation: Close and fine on cheeks, vertex medially, scutellum, mesonotum except in center, and pleura; more coarse and distinctly though not widely separated on vertex laterally and center of mesonotum; shallow and quite close on clypeus; minute and crowded on abdomen basally, becoming more coarse and distinct, yet close to the fifth segment, fine and close, but largely obscured on the sixth.

Color: Black; tegulae and wing nervures more piceous; wings subhyaline, slightly clouded apically; spurs yellowish.

Pubescence: White on face, cheeks, pleura, propodeum, scutellum, legs and basal segment of abdomen; black on vertex, around ocelli, over most of disc of mesonotum and on discs of second to fifth segments of abdomen, the sixth with erect black hairs and pale appressed tomentum; mesonotum with a barely discernible pair of anterior oblique lines of white tomentum and the scutello-mesothoracic suture obscurely sub-fasciate; abdominal segments with entire white apical fasciae, the more basal ones narrow, the apical ones dense and conspicuous; scopa white, black on sixth sternum.

Type.—Female: Boulder, Colorado, 7, 8, [July 8 or August 7?], 1927, (E. C. Nelson), [Univ. Colo.].

Descriptions of all of the following species will be found in Part 1 of this revision.

Megachile (Xeromegachile) oslari Mitchell

Megachile (Xeromegachile) oslari Mitchell, Trans. Am. Ent. Soc., LIX, p. 330, 1934.

Type.—Female; Berkley, Colorado, 6. 10 [June 10?], (E. J. Oslar), [U.S.N.M., no. 44247].

This is a unique specimen.

Megachile (Xeromegachile) pagosiana Mitchell

Megachile (*Xeromegachile*) *pagosiana* Mitchell, Trans. Am. Ent. Soc., LIX, p. 333, 1934.

Type.—Female; Pagosa Springs, Colorado, about 7200 feet, June 22-24, 1919, [Am. Mus. Nat. Hist.].

This is a unique specimen.

Megachile (Xeromegachile) seducta Mitchell

Megachile (*Xeromegachile*) *seducta* Mitchell, Trans. Am. Ent. Soc., LIX, p. 342, 1934.

Type.—Female; Keen Camp, Riverside County, California, June 6-12, 1917, (E. P. Van Duzee), [Calif. Ac. Sc., no. 3619].

This is a unique specimen.

Megachile (Xeromegachile) toscata Mitchell

Megachile (*Xeromegachile*) *toscata* Mitchell, Trans. Am. Ent. Soc., LIX, p. 341, 1934.

Type.—Female; Fort Collins, Colorado, September 7, 1903, [Colo. State Ent.].

This is a unique specimen.

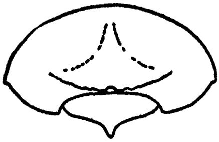
EXPLANATION OF PLATES

PLATE XXII

Outlines of front tarsus and apex of abdomen in males of *Xeromegachile*.

PLATES XXIII TO XXVI

Outlines of fifth, sixth and eighth sternum and genital armature in males of *Xeromegachile*.



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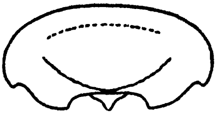

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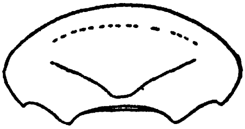

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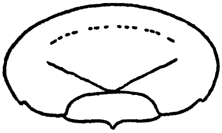

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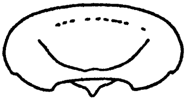

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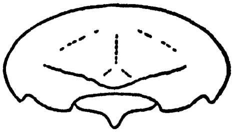

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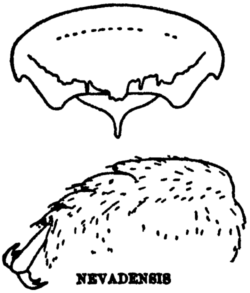

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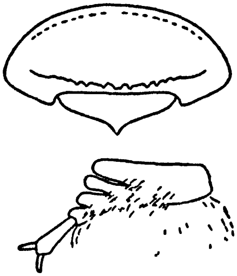

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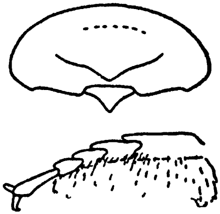

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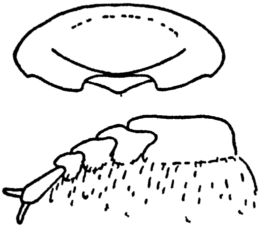

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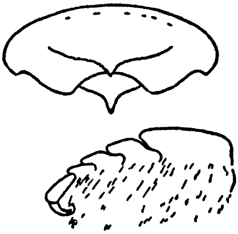

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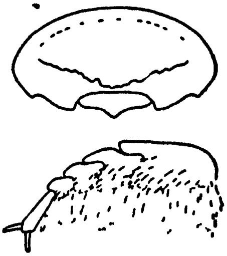

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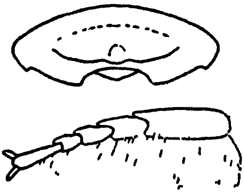

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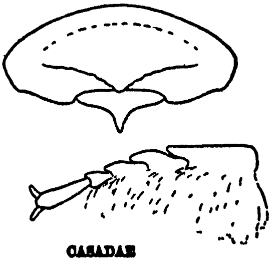

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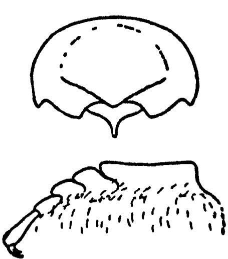
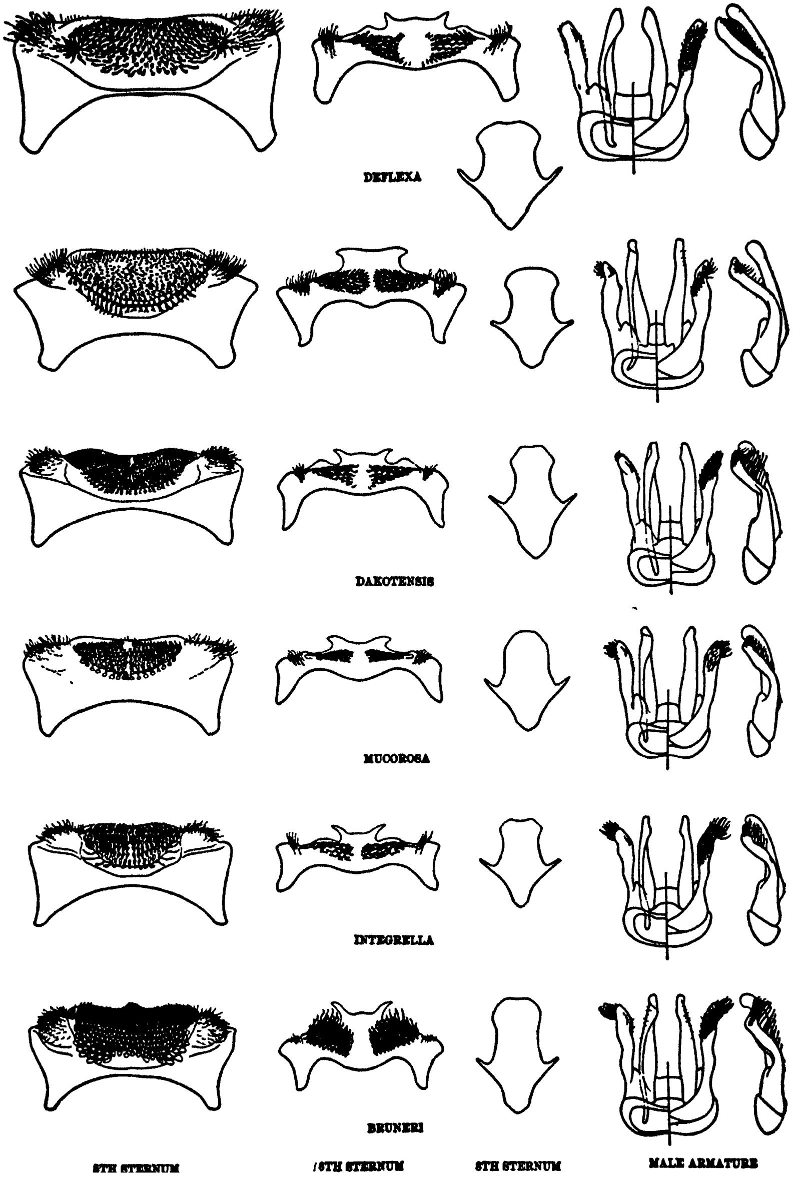


MAURATA

MITCHELL—NEARCTIC MEGACHILE



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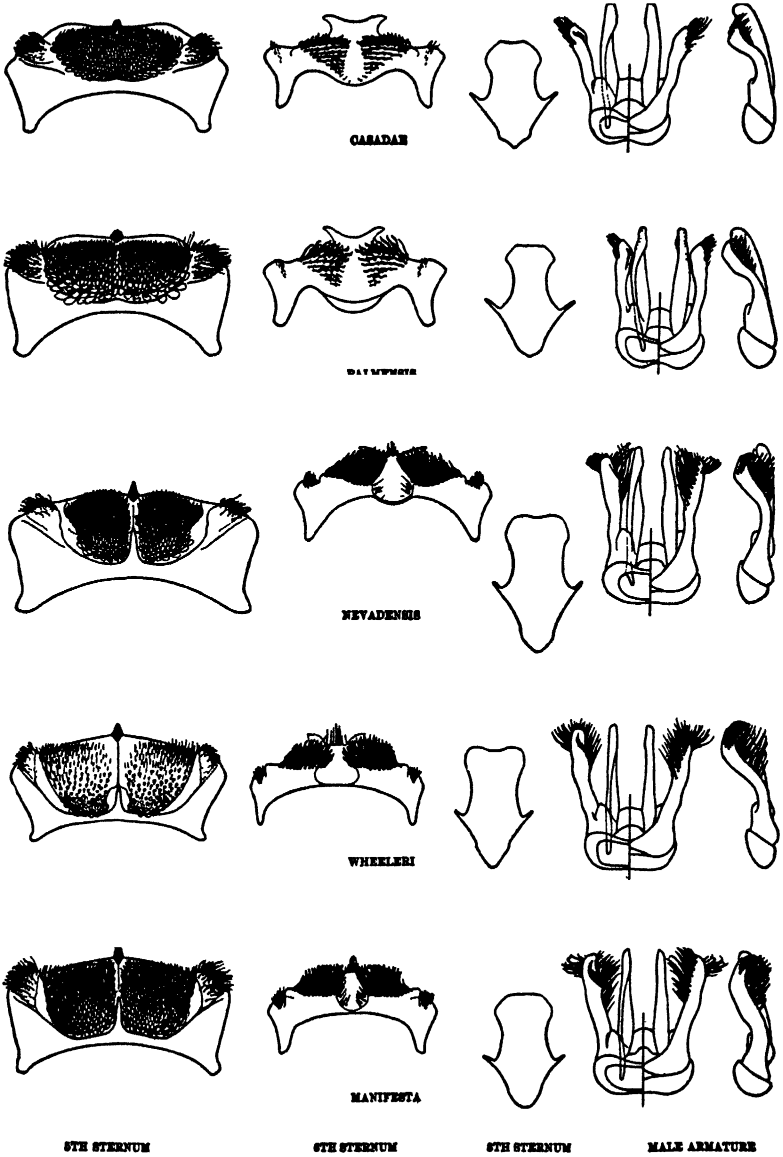
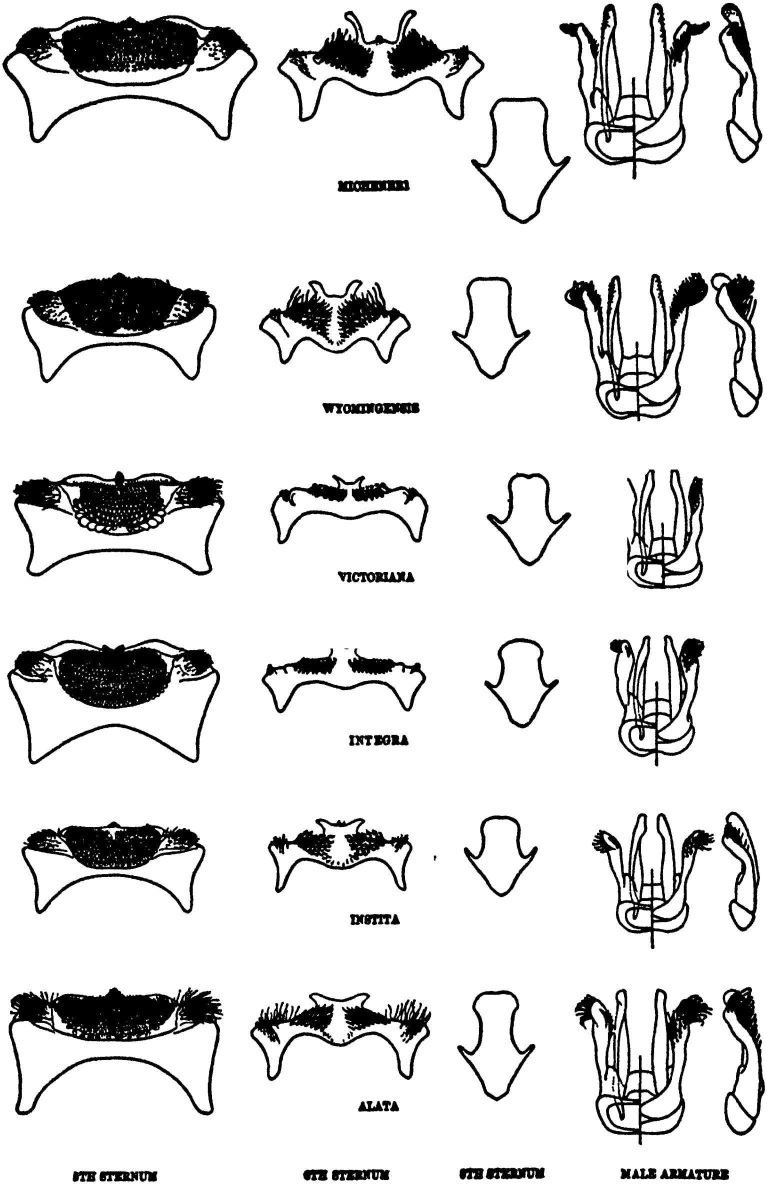
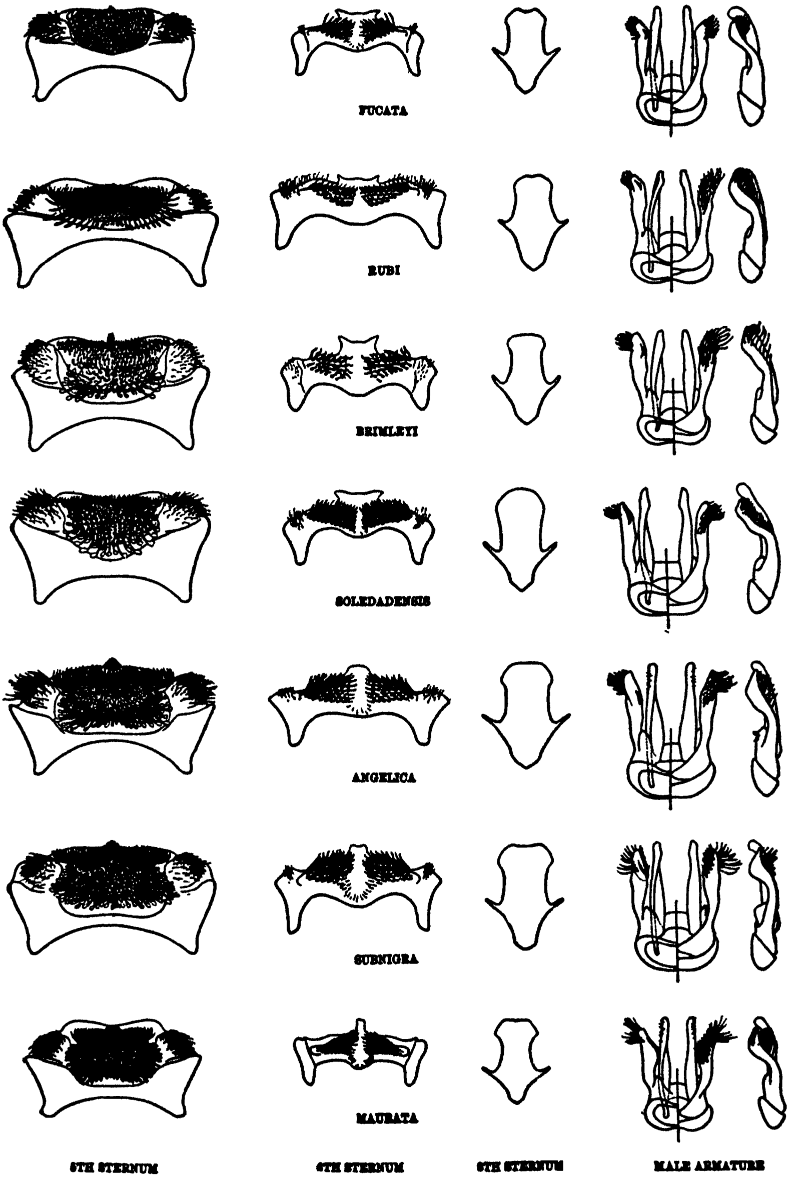


MITCHELL—NEARCTIC MEGACHILE



MITCHELL—NEARCTIC MEGACHILE



MITCHELL—NEARCTIC MEGACHILE

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